

AUTOMOTIVE INDUSTRIES

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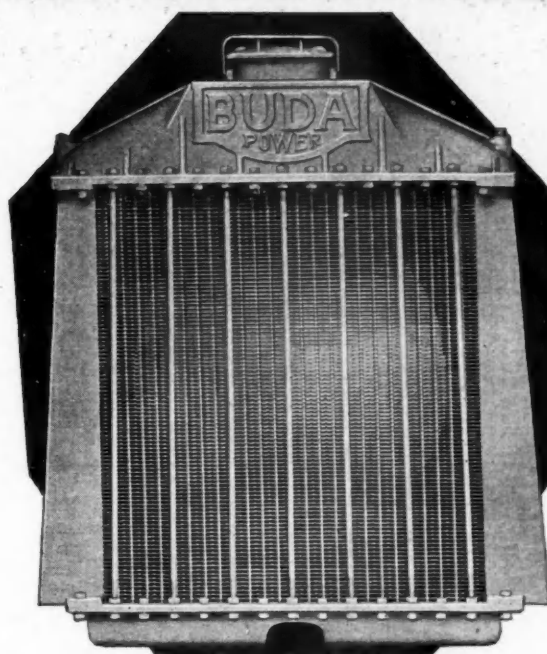
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Automotive Industries



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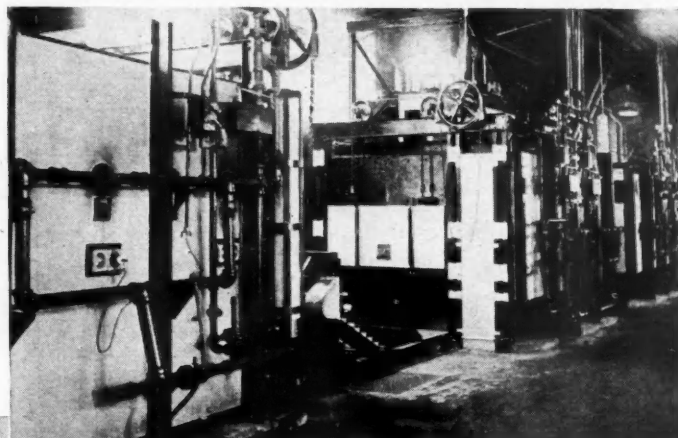


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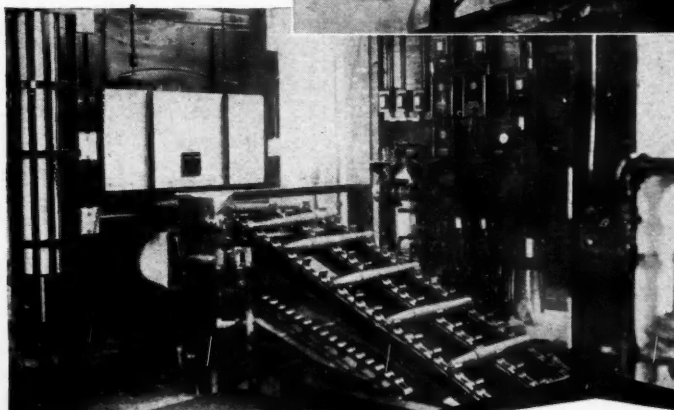


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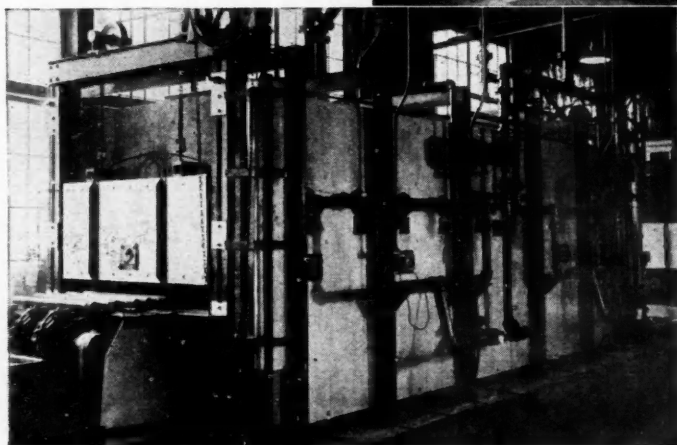
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Cash Fortifies Most Companies Approaching 1931

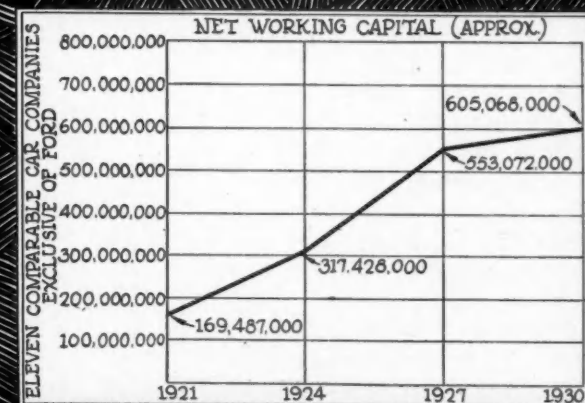
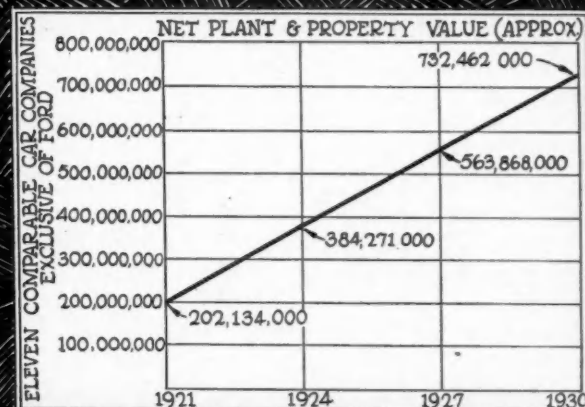
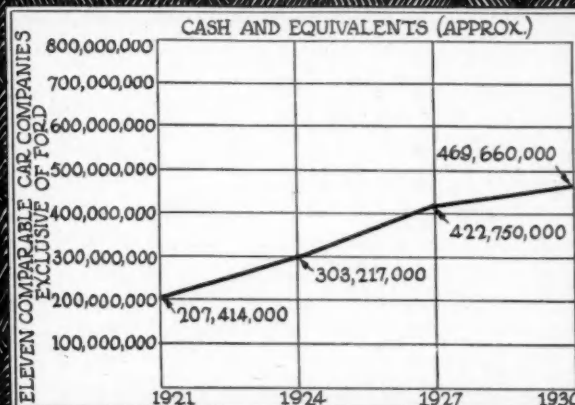
by Leslie Peat

AUTOMOBILE manufacturers will step into the forthcoming year with larger net working capital, larger net property and plant value and a larger supply of cash on hand than they had immediately following the slumps of 1927, 1924 or the extreme depression of 1921. Eleven comparable companies show cash and equivalent total about \$469,660,000, as compared with 422,750,000, as of 1927; \$303,217,000, as of 1924, and \$207,414,000, as of 1921.

Although an accurate comparison of the ratio of net working capital to dollar volume of sales cannot be made in many cases, the larger companies in the industry have weathered the present slump most gracefully in this regard. Most of the larger concerns show a sound volume of working capital per car sold, and in practically all cases the companies show a better ratio this year than during previous slump periods.

Most of the companies have maintained a strong financial and operating position with regard to the contingencies of the future.

The sum of the cash (or equivalent), working capital and plant and property values of 11 companies listed on the New York Stock Exchange is considerably more than the present market value of these companies. In some specific cases, the sum of the cash on hand and other quick assets



The comparative positions of 11 car companies during the depressions of 1921, 1924, 1927 and 1930 give a cross-section view of the industry during these periods + + + +

Table No. 1

Financial Position of Eleven Car Companies During Four Depression Periods

Cash and Equivalents (Approximate)				Net Plant and Property Value (Approximate)			
1930	1927	1924	1921	1930	1927	1924	1921
\$469,660,000	\$422,750,000	\$303,217,000	\$207,414,000	\$732,462,000	\$563,868,000	\$384,271,000	\$202,134,000

Net Working Capital (Approximate)			
1930	1927	1924	1921
\$605,068,000	\$553,072,000	\$317,428,000	\$169,487,000

total more than the present market, value of the stock.

It would seem, therefore, that if the present manufacturing and distribution economies of the companies are to be continued, profits during the next 18 months will show a very healthy recovery, the factories having so firm a financial position at the outset.

Although not limited to the automotive industry, the practice of car and parts companies in keeping their plant and property accounts to low levels, has been a powerful influence in the present financial strength of a number of companies.

Because of the downward trend in prices—which may be fairly stated as being far sharper than manufacturing economies alone would warrant—the increased production expected for 1931 and 1932 will probably show only a slight gain in profits per unit sold.

But, on the other hand, the present comparatively strong financial position of the major car companies will give the industry a momentum when production does pick up, and if earnings of car companies do not show an immediate rise, parts company earnings will probably reflect profits early next year.

The trend of net earnings per car and earnings per dollar of sales (Table 2), shows how price cuts have not altogether been governed by manufacturing economies. In spite of the fact that mass manufacturing methods produced a record number of passenger cars in 1929, the profits to manufacturers were under those of any previous year. The 13 companies considered in making these comparisons excluded General Motors Corp. and Ford Motor Co.

It is evident that this decrease in profit-margin on either a per car or per dollar basis reflects considerably more in the way of price reduction than manufacturing economies when we examine the ratios of the smaller independent

companies. Apparently mass production methods and more level monthly production programs have

played a large part in keeping manufacturing costs down.

But taking the 13 manufacturers (omitting General Motors and Ford) earning per car sold declined about 30 per cent from 1925 to 1929, in spite of the fact that 1929 production for these companies was about 20 per cent greater than that of 1925.

Studying the ratio of earnings to dollar-volume-of-sales of 15 independent companies we see that several companies actually reached their peak in earning capacity as far back as 1923. Only two of these concerns made their peak earnings in 1929; thirteen of them reached their maximum as earners during the period between these years.

This group earned its highest ratio during 1925, and earned about 30 per cent less in 1929, the year of record production.

Apparently mass production economies which have enabled the two largest producers in the industry to earn more per car at reduced prices, have not been sufficiently adaptable to save the smaller automobile factories from lagging in profit ratios.

As everyone in the industry knows, it is exceedingly unlikely that there will be any general, substantial upward revision of f.o.b. prices of automobiles in the near future. Keen competition between manufacturers will probably make for continuance the slogan "better

cars for less money" for some time to come. It would take a very considerable increase in prices to offset the trend toward comparisons excluded General Motors Corp. and Ford Motor Co.

The fact that the independent—and particularly many of the smaller—manufacturers show a more rapid decline in the ratio of earnings, would lend some weight to the belief that next year will see some important mergers in the industry.

Table No. 2

Earnings of 13 Comparable Car Companies Since 1925

(Exclusive of Ford and G.M.)

	Earnings Per Car Sold†	Earnings Per Dollar of Sales
1930*	\$70.11	\$0.05
1929	71.16	.06
1928	84.78	.08
1927	83.33	.065
1926	90.18	.067
1925	118.78	.098

* Estimated.

† "Economic Survey No. 4," The Midland Bank, Cleveland.

JUST AMONG OURSELVES

'Twas a Real Thrill

HOPE everybody got the same thrill we did last week from looking at *Automotive Industries* Weekly Production Chart.

For the first time in 1930 the production for the week exceeded that of the corresponding week last year.

We'd gone so long without beating last year even for a week, that we had begun to think the year was going to close without doing so. Consequently, we feel that the industry is entitled to a little glow of satisfaction even though the increase was due largely to the stepped-up production of a single manufacturer—Chevrolet.

There Is No Limit

RIGHT on top of F. E. Moskovich's vigorous statements about the radical engineering developments which lie ahead for the industry, there have come to us from several sources indications of interest in rear-engined passenger cars.

Like free-wheeling, four-wheel brakes and balloon tires, automobiles with engines placed in the rear instead of in the front have been built in the past and have been known for many years. Yet they never have attained any commercial prominence.

Perhaps they won't now, but we're not nearly so skeptical about what might develop into importance as we once were. It's only about a year and a half ago that ten of the best passenger car engineers in the industry wrote to us that free-wheeling

wasn't likely to come in American cars and expounded numerous and sundry reasons for that belief. Two stock cars have free-wheeling now and more will have it within a few months.

There are few engineering possibilities today which the engineer can consider too radical for serious consideration.

Better Times Are Up to Us

WHILE the automotive industry is busy wondering when other industries are going to pick up so that people can and will buy more automobiles, Sam Miles comes along with some vigorous advance Show publicity to prove that if this great industry of ours just gets going we'll pull a lot of others with us.

He brings together a lot of figures which most of us knew about but which too many of us have forgotten, proving the automotive industry to be the largest consumer of steel, gasoline, rubber, plate glass, nickel and lead—and a most important consumer of the products of scores of other industries.

Pick-up in automobile and truck sales will mean a real turn for many other industries.

That puts a big responsibility on everybody in our industry—and on the sales organization in particular. Responsibility for determining just when business will get better may lie right on the shoulders of the individual retail salesman after all.

His vigor, effectiveness and drive—backed by powerful, ade-

quate factory advertising—are the only things which can thaw these frozen resources which, according to the economists, individuals have been hoarding in savings banks and stockings.

It's going to be up to the salesmen of the automobile business to drag those resources out of moth-balls, stand them up in a row and yell "Forward March in 1931."

And there's no doubt that it's going to be done!

With a Kick Between the Covers

THERE isn't a reader of this page who will not get at least half an hour of real interest, stimulating pleasure and highly informative reading out of the 75th anniversary issue of the *Iron Age*, published Nov. 20, 1930.

Here is the humanized, vitalized story of the progress of American industry; the activities of the past interpreted vividly in terms of the future. The series of colorful inserts—"A New Perspective of Time and Progress"—well typify the spirit and accomplishments of this really epoch-making issue of a business publication.

Old-timers—youngsters—active middle-aged executives, engineers and production men—all will be touched somewhere, we'll guarantee, by the magic of the vast industrial panorama unfolded. We got a great kick out of this issue, and we think you will too—if you haven't already done so.—N.G.S.

In Step With Diesel Engine Developments

Specialization Will Help to Overcome of Production and Solve Metering

It is the object of this article to point out the limitations of the automotive Diesel engine in its present state of development, to trace the defects that are responsible for these limitations, and to offer a few guesses as to how some of the limitations may be overcome in the future.

Specific Weights

Truck Diesel engines weigh 16 to 40 lb. per hp., the average being about 30 lb. Corresponding carburetor engines weigh only about 12 lb. per hp. Aeronautic Diesels weigh about 3 lb. per hp., but the lightest gasoline engines, only 1.2 lb. per hp. The Diesel thus outweighs the carburetor engine 2.5 to 1 in both classes. With this ratio against it, only a limited field of automotive application can be expected for the Diesel engine. Lower speeds, low mean effective pressures, and high maximum pressures are usually cited as being responsible for the unfavorable weight ratio of the Diesel engine.

According to the views of several authorities, engine weights are (or should be) proportional to the ratio of maximum pressure to mean effective pressure. However, if this relation strictly held, the Packard Diesel, having a maximum cylinder pressure of 1200 lb. per sq. in., a brake mean effective pressure of 93 lb. per sq. in., and a total weight of 2.26 lb. per rated hp., would be an impossibility. The fact is that the frequently cited relation is far from being exact. While the output of an engine is obviously in proportion to its mean effective pres-

The author of this, the second in a series on Diesel Engine Developments, forecasts that the mean effective pressure will be raised 30 per cent by a better coordination of spray and combustion chamber form, and the speed raised 50 per cent by cutting down the ignition lag, placing the Diesel on a par with the carburetor type.

by Dr. P. H. Schweitzer

Associate Professor of Engineering Research
Pennsylvania State College

sure, its structural weight need not be in proportion to the highest cylinder pressure, at least not in the case of really high-speed engines. It is easy to see that the weight of the crankcase, valves, valve gear, intake and exhaust manifolds, as well as those of parts for injection, lubrication and cooling, are more or less independent of the maximum cylinder pressure. It is less obvious that not even loads on main bear-

ings, crankshafts, connecting rods and cylinders are determined by the maximum gas pressure. The explanation is this: It has been observed that in many high-speed Diesel engines which operate on the mixed cycle principle, with very high maximum pressures, these high pressures occur only when the engine is *running at high speed*. As soon as the speed drops off, the flame propagation decreases, because of the decreased turbulence, which results in considerably lower maximum pressures. At high speeds the inertia of the piston and connecting rod counteract the gas pressures and the maximum loads occur at the time of the cycle when the gas pressure is low or zero. When we get into really high speeds, say 4000 r.p.m., it is possible to get tension instead of compression in the connecting rod even during explosion. At starting or in low speed operation the explosion pressures do not reach dangerous values. When they do occur they are counteracted by the inertia. Therefore, crankshafts, main and connecting rod bearings of modern high-speed engines should not be proportioned according to the

High Cost Problems

maximum instantaneous pressures in the cylinders.

The cylinder head and the piston head are about the only parts that are subjected to the explosion load, and even in the design of these parts, considerations of heat flow rather than of mechanical load often carry most weight.

The conclusion is that in a well-designed high-speed Diesel engine the structural weight need not increase nearly as fast as the maximum cylinder pressure. It would probably be more nearly correct to assume it to be proportional to the square root of that pressure.

The odds, however, are seriously against the Diesel in respect to mean effective pressures and crank speeds. About 100 lb. must be considered the present practical limit of brake mean effective pressure for Diesels, even though 121 lb. has been attained experimentally. It certainly is less troublesome to get 150 lb. or, with supercharger, even 200 lb. b.m.e.p. out of a carburetor engine than 100 lb. out of a compression-ignition engine. This drawback is not easy to overcome, because it is more or less inherent in the compression-ignition principle. The fuel being introduced, mixed with air, ignited and burnt, all during a fraction of a revolution, one cannot hope that all of the air available in the cylinder can be utilized for combustion. The time is too short to allow a combination of all the oxygen molecules with all the

fuel molecules. We either have to waste air or waste fuel. Usually the first course is taken, and Diesel engines of today operate with about 100 per cent excess air. To reduce the excess air to 30 per cent and maintain a reasonable fuel economy (as was done by the British Air Ministry) is a remarkable achievement. What are the theoretical limits?

Taking the constant-pressure Diesel cycle as a basis and a 14 to 1 compression ratio, theoretically we can get 185 lb. mean indicated pressure, and we also can get a fuel consumption as low as 0.25 lb. per hp.-hr.; but even theoretically we cannot get both together. Having 185 lb. m.e.p., the theoretically lowest fuel consumption is about 0.41 lb. With 0.25 lb. fuel consumption the theoretically highest m.e.p. is 104 lb. The theory referred to considers, besides the variation of the specific heats, also the effect of excess air, residual gases, dissociation and unavoidable after burning. It shows that if we cut the excess air to below, say, 50 per cent, we sacrifice too much in fuel economy. With 50 per cent excess air the theoretical limits for a non-supercharged engine operating on the Diesel cycle are 165 lb. m.e.p. and 0.30 lb. fuel consumption, and the practical limits perhaps 25 per cent worse, i.e., 124 lb. m.e.p. and 0.375 lb. per hp.-hr. Using the mixed cycle, the theoretical figures probably can be improved to 140 lb. m.e.p. and 0.32 per hp.-hr. By supercharging, the mean effective pressure may be pushed up in the future to 175 lb., and with the two-stroke cycle to $2 \times 100 = 200$ lb. At present we are far from realizing these figures in practice. Much better control over injection and distribution is needed to attain such performance.

Articles on Heavy Oil Engines and Design Which Have Appeared in Automotive Industries During 1930

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Engine Speed

As regards engine speed, the present practical limits for compression-ignition engines are about 2000 r.p.m. and 1500 ft. per min. piston speed, although somewhat higher speeds have been reached experimentally. Here again a comparison with the carburetor engine is in favor of the latter by at least 2 to 1. Let us analyze how much improvement can be reasonably expected in engine

speed. Possible limiting factors are: (1) speed of injection, (2) speed of ignition, (3) speed of combustion, (4) inertia of reciprocating parts, and (5) volumetric efficiency of the air charge.

Of these, we may at once eliminate No. 3, which was considered as most serious not so long ago. Now we have ample evidence that the speed of combustion, or the rate of flame propagation, is so high as not to represent a real limitation; moreover, it increases with engine speed, owing to the greater turbulence at high speeds.

Limitations 4 and 5 are not particular to the Diesel engine but apply to carburetor engines as well. The intelligent use of aluminum and other light alloys for reciprocating parts permit speeds as high as 7000 r.p.m. Two-cycle Diesel engines of 2½ in. bore could be charged and scavenged at 9000 r.p.m., according to the calculations of Dr. Holm, reported by the author. As long as we are far from approaching carburetor-engine speeds, these limitations are more potential than actual.

Ignition Lag

Injection lag is characteristic of Diesel engines and cannot be considered negligible. According to tests, it amounts to about one one-thousandth of a second if the pump is located adjacent to the spray nozzle, and to two one-thousandths if there is a 45-in. injection tube in between. These lags correspond to crank angles of 12 and 24 deg. respectively, in a four-cycle engine running at 2000 r.p.m. We may allow for this delay by injecting the fuel proportionately earlier. However, when expressed in crank degrees, the injection lag increases with the speed, and sometimes also with the load. For proper ignition timing, variable-speed and variable-load engines must have means for varying the beginning of injection. With that provision the injection lag need not be considered as a speed-limiting factor.

The fuel does not ignite instantly upon entering the combustion chamber, as the oil particles must first be brought up to their ignition temperature, and the beginning of a noticeable pressure rise is further delayed, because for a time the ignition remains localized around a nucleus or several nuclei and does not influence the pressure. This is known as "still burning." Ignition lag is the time which elapses from the moment the first globule leaves the spray nozzle to the beginning of pressure rise, due to combustion. It decreases as the temperature, pressure, air turbulence and fineness of atomization increase. A lag of 0.002 second may be taken as the practical limit for high-speed engines.

The annoying feature of the ignition lag is that it cannot be compensated for by an earlier timing. If the ignition lag is too great, the amount of fuel introduced up to the time of the first pressure rise will cause an excessively violent pressure rise, which results in roughness of operation and undesirably high cylinder pressures. This condition is aggravated when injection is started as early as 50 to 60 deg. before top dead center. It tends to produce an undesirable pressure rise before dead center, result-

ing in back pressure on the rising piston. A considerable portion of the fuel charge being injected when the temperature of the air is still comparatively low and when there is as yet only little turbulence, a good part of it will fail to burn altogether. For best results each drop of fuel should be burned as soon after injection as possible. It is difficult to decrease the ignition delay, which latter therefore constitutes the most serious limiting factor with respect to the speed and output of compression-ignition engines.

In order to obtain a satisfactory thermal efficiency, the injection period must not exceed 40 deg. and should preferably be around 30 deg. of crank motion. To avoid accumulation of the charge preceding ignition, the ignition lag should not be more than 20 per cent of the injection period, that is, 6-8 deg. of crank angle. In an engine running at 2000 r.p.m. this corresponds to 0.0005-0.00066 second. It is a real problem to reduce the ignition lag so low.

Serious efforts to reduce the ignition lag will be witnessed in the near future, and some or all of the following methods will be employed:

1. Finer atomization, at least a small portion of the spray being atomized into very small globules that heat up rapidly to the ignition temperature and by their combustion supply heat to the rest of the spray for igniting the larger globules.
2. An external source of heat, such as spark plugs or hot surfaces, to initiate combustion.
3. Higher compression pressure and temperatures; the traditional compression ratio of 14 to 1 may be replaced by compression ratios as high as 18 to 1 or 20 to 1. The resulting higher compression temperatures will help to reduce the heating-up period of the oil globules. The use of steel piston rings and cylinder liners of nitrided steel may permit a considerable increase in the compression ratio.
4. Injection started very early, but restricting it during the preignition period to very small quantities in order to prevent the accumulation of unburnt oil in the chamber. Some sort of a pilot spray might be used to obtain this result.

None of the other objections raised against the Diesel, such as difficulties of starting and of metering, and the high cost of production, is serious enough to be considered as a limitation. Specialization in the manufacture of engine parts bids fair to prove a solution of the last two problems—increase in compression ratios and the introduction of inertia starters, of the first.

Conclusion

The high-speed compression-ignition engine at present compares unfavorably with the carburetor engine with regard to horsepower output per unit of weight on account of its lower mean effective pressure and lower speed. The chances are that its mean effective pressure will be raised 30 per cent by a better coordination of spray and combustion chamber form, and that the engine speed will be raised 50 per cent by cutting down the ignition lag. That will put the Diesel engine at least on a par with the gasoline engine.

Inspection Fixture Certifies Accuracy

QUALITY control in every sense of the word is exemplified at Pierce-Arrow by the master testing fixture and gages designed for the new 8-cylinder engine block. Not satisfied with the usual routine inspection, they have imposed additional tests among which are a check on the actual relation of the valve guide bore with respect to the camshaft and a check on the vertical alignment of cylinder bores with respect to the crankshaft bearings. A number of other tests are described more in detail later. As the first step in this program they built the master inspection fixture, Fig. 1, which is essentially a massive, accurately machined surface plate with certain functional attachments. The numerous individual plug gages and other attachments are shown in Fig. 2. The cylinder block, shown in place in Fig. 1, is definitely located by registering with holes in the bottom face.

Checking the axial alignment of valve guide bores is probably an unusual precaution, but it was felt desirable to add the operation to assure a perfect alignment of valve and tappet mechanism. The setup for this is shown at the extreme right, Fig. 1; another view of the gage is found at the right in Fig. 2.

In operation the U-shaped jaw is slipped into place and the plug shown in Fig. 1 inserted. Three dial gages for checking alignment in three directions give the desired information. The original zero setting for the dials is made on the master setting stand shown in Fig. 2. The check described here is made twice; once for the bore and a second time after the valve guide has been pressed in. Plugs of different diameters of course are used with each setting.

Another interesting attachment shown in the center in Fig. 2 (this is the gage equipped with two indicator dials), checks the squareness and cross-wise alignment of valve guide pads. The attachment for checking the cylinder bores is clearly evident. It is arranged to check the alignment of the bore axially with the main

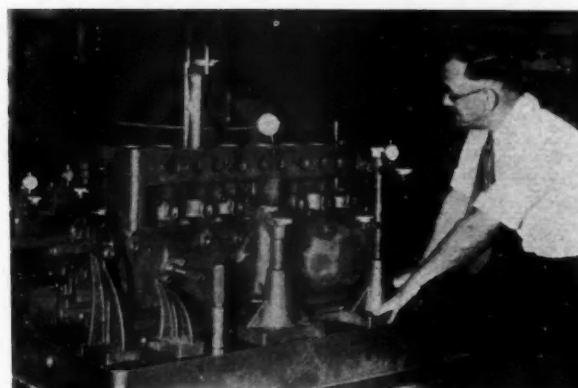


Fig. 1—The cylinder block in place is shown in this view + + + + +

bearings; also crosswise and lengthwise of the bore.

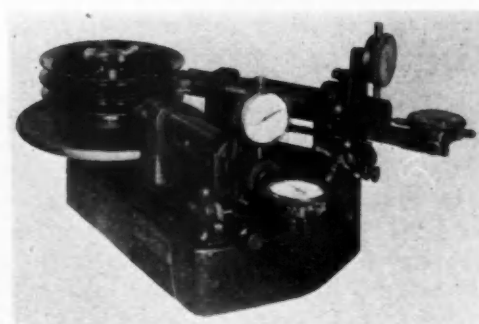
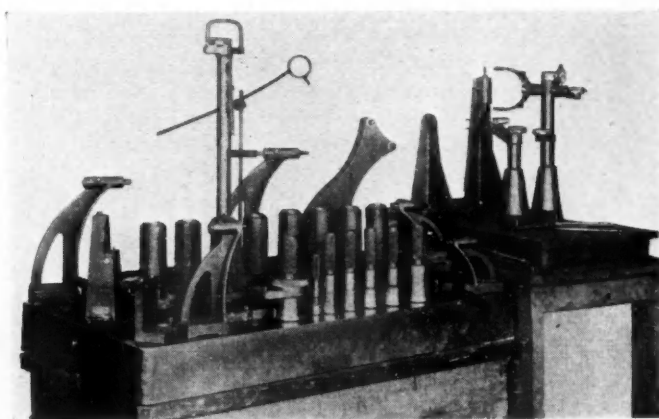
The relation between the main and camshaft bearing centers is checked by the sector-like plug gage with inserted buttons which is seen in the front row of plugs in Fig. 2. Each of the buttons represents a definite step in the established tolerance range.

Probably one of the most interesting fixtures is the one shown in Fig. 3 which was designed to check the double-grooved spun type fan pulley. This gage checks the run-out and angularity of the pulley races radially and laterally, the most important feature being that the check is made by means of a roller shaped exactly like the fan belt. Both driver and driven pulleys, although of different diameters, are checked in the same fixture by changing the relative positions of the two spindles.

In operation the pulley is clamped into the fixture to simulate the exact position on the flange of the drive shaft. The spindles are moved out of the way and then located in position by coming to the high point of the throw-out cam at the wing nuts which are seen at the side.

Fig. 2 (left)—The original zero setting is made here + + + + +

Fig. 3 (below)—A fixture designed to check double-groove spun type fan pulley + + + + +



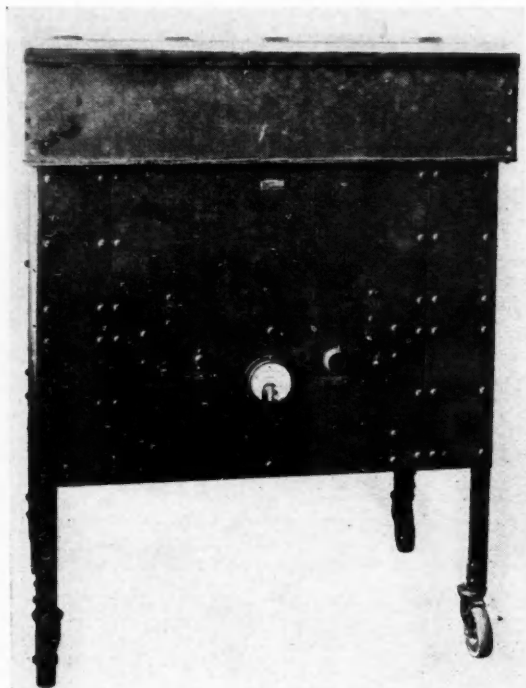


Fig. 1—The Hardy Colorimeter is made by the General Electric Co. + + + + +

Attainment of Uniform With Introduction of

Slight differences in color, which are serious factory as well as merchandising problems, can now be subjected to color analyzers which produce a spectral curve of any sample

by Joseph Geschelin

ACCORDING to Luckiesh¹, about 90,000 different colors can be perceived by a normal sensitive eye under certain ideal laboratory conditions (See Appendix 1). No attempt will be made here to champion this figure, its introduction being merely to define some upper limit for the acuity of the normal eye, and then to accept the reasonable corollary that the human eye certainly is capable of perceiving a lot of colors.

To the automotive industry, color and its resulting eye appeal are certainly among the important factors in merchandising and, consequently, the color perception of the eye offers boundless possibilities to the talents of the color artist. By the same token, the fact that the eye is so sensitive to slight differences in color imposes a serious technical problem on the paint technologist and the painting department. With them, it is a constant struggle to maintain paint standards; to control the operations in the finishing department, and to assure a perfect match with each incoming shipment of paint. Other questions of relatively equal importance will be noted later. Suffice it to say for the moment that the problems of paint control are reflected to the manufacturer of paint who is between two fires, having on the one hand his own technical problems, on the other, the necessity for meeting the paint users' specifications and working out other field problems.

As a result of intensive work by physicists and color technicians, the research laboratory now offers what appears to be a definite approach to the solution of the color problem. We refer specifically to the

availability of automatic spectrophotometers (color analyzers) designed to serve as production machines for automatically producing a spectral distribution curve of any color sample. Briefly, this machine provides a graphic method of scientifically measuring color, of resolving any color into a definite and unmistakable specification which may take the place of color samples or word pictures. The resulting record can be set up as a permanent, unchangeable standard which may be duplicated and matched.

Even at this early stage it is possible to foresee the importance of this new technique in filling paint orders, manufacturing control, color matching and a scientific method of inspection which may eliminate the human equation.

In a measure it is agreed that the sensation of color² has three outstanding characteristics, namely, hue, intensity and saturation, which may be defined as follows:

HUE—For our purpose, dealing with paint we may consider that any sensation measurable in terms of spectral wave-lengths may be considered as hue.

INTENSITY, otherwise brilliance or brightness, may be defined as that percentage of the incident light which any color reflects.

SATURATION is that attribute of all colors possessing a hue which determines degree of difference from a gray of the same intensity. At 100

¹ and ²—See Bibliography at the end of this article.

Color Standards Approaches Spectrophotometers

per cent saturation, the hue of a color is at its maximum purity.

In addition to these specific attributes of color are some general terms which may be defined for our purpose in the following manner: **VALUE**—A measure of the amount of light or dark in a color. **TONE**—A general term applied to any color. **NORMAL COLOR**—Sometimes called the pure color since it is, technically, the spectrum at maximum intensity or maturity. **TINT**—A lightening, brightening or dilution of the normal color by additions of white. **SHADE**—Is the darkening of any normal color by additions of black. This can be continued until the normal color approaches the black.

Without looking too deeply into the maze of color technology we may consider the spectrophotometer, or color analyzer, as we shall call it hereafter, as a distinctly analytical instrument designed to provide a graphic record unique for any color sample presented to it. So far as the principle of operation is concerned, suffice it to say for the moment that the color analyzer resolves any given color sample into its elementary spectral components by refraction through a suitable prism built into the spectroscop. Since every spectrum component within the range of the human eye has a distinct wave

length boundary, the color analyzer (except the A.P.C. machine, see below) matches the spectral component at each wave length against a standard white, usually magnesium carbonate ($MgCO_3$) and quantitatively compares their relative intensity.

Automatic color analyzers now available commercially are the General Electric instrument, Fig. 1, which is called the Hardy colorimeter; the Razek-Mulder color analyzer, Fig. 2, made by the Burgess-Parr Co., Chicago, Ill.; and the A.P.C. instrument (Fig. 3) designed by the American Photoelectric Corporation and manufactured and sold by Eimer &

Amend, New York City. Although differing in certain fundamental respects (see Tables 1, 2 and 3) these machines are entirely automatic in action and use the photoelectric cell to replace the human eye as the means of measuring or evaluating reflection coefficients.

One important difference between the A.P.C. machine and the other makes is that it does not use a standard white for intensity or reflection measurements, since the special electric circuit, described in Table 3, gives absolute reflection coefficients. Incidentally, while the G.E. and Razek-Mulder machines produce the spectral distribution chart, automatically, the chart for the A.P.C. instrument is plotted from a test log.

Many readers already are

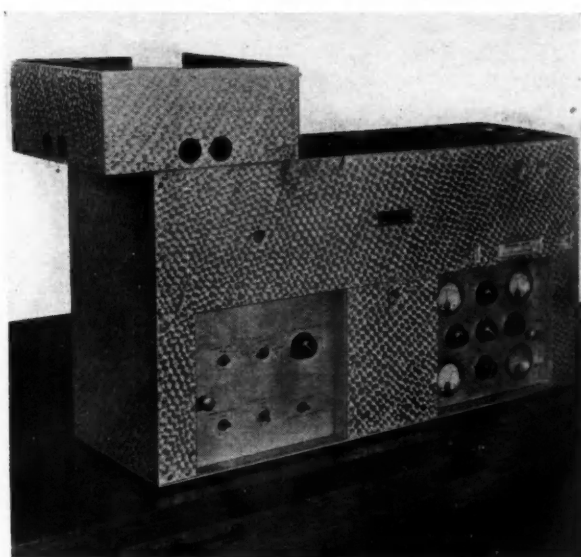


Fig. 2—The Razek-Mulder color analyzer is made by the Burgess-Parr Co. + + +

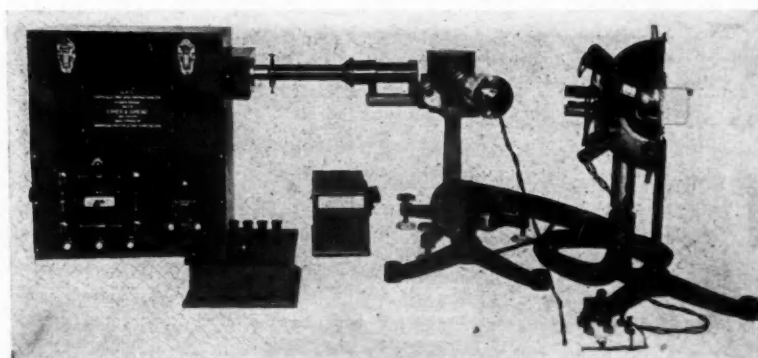


Fig. 3—The A.P.C. was designed by the American Photoelectric Corp. and made by Eimer & Amend

Table 1

THE operation of the General Electric recording color analyzer is essentially as follows: Light from a vertical, tungsten-ribbon filament passes into the slit of a dispersive system. Emerging from this system through another slit as monochromatic light, it is passed into a collimator. Here it is divided; half is taken off with a right prism and brought to a focus at a sample stand, and half passes through a shutter and is brought to focus on a flicker disk, which has on its surface a standard white pigment. Light from the sample is collected and brought to a focus in the plane of the flicker disk and is passed into a photoelectric tube. As the flicker disk is revolved, the photoelectric tube views alternately the standard and sample at a rate of 60 alternations per second. A greater amount of light reflected from the standard than

from the sample results in a pulsating photoelectric current which is amplified electrically and used to control a motor-operated shutter in the standard light path. This shutter will operate until the beams are of equal intensities. The balance point is indicated by the recorder. As the recorder drum revolves, the wave length of the light passing through the exit slit of the monochromator is varied at a uniform rate from 400 to 700 millimicrons, and the curve obtained indicates at each wave length the position of the shutter which allows an amount of light to be reflected from the standard equal to that being reflected from the specimen. Approximately 3½ minutes is required to obtain a characteristic curve—the period from the time when the pen starts drawing the curve until it is raised after completing the curve.

familiar with the Keuffel and Esser color analyzer which is illustrated and described in Table 4. This instrument probably was the first simplified spectrophotometer designed for industrial use and has been on the market for a number of years. The K & E machine, as well as the more formal laboratory spectrophotometer recently designed by Bausch & Lomb, is strictly an optical instrument. Point by point readings at each wave length are taken by the operator and the spectral distribution curve afterward plotted from the test log. The same procedure obtains with the A.P.C. machine.

Despite differences in principle of operation and fundamental differences in design, the color analyzers mentioned here produce the same type of record. Consequently the interpretation of results is identical and universal. And although it may seem surprising to those not actively concerned with developments in color technique, the spectral distribution curve of any given color sample contains included hues, the presence of which is certainly unsuspected to say the least. Before discussing the specific curves, let us examine Table 6, which gives the wave length boundary for hues in the visible spectrum which ranges, approximately, from 400 to 700 millimicrons, the unit "millimicron" (μ) being one millionth of a millimeter in length.

Now coming to the graphic records, Fig. 4 shows the spectral distribution curve for certain samples of red, blue and yellow. These results were obtained on the K. & E. color analyzer and plotted on a logarithmic chart. Fig. 5 shows a series of curves made on the G.E. color analyzer specifically for this article. The samples used in this test were panels of automobile lacquers of ivory, brown and jade green. By the way, this is a mechanically traced record characteristic of the G.E. machine. In Fig. 6 is reproduced the photographic film record made by the Razek-Mulder color analyzer.

Considering these, we observe that the abscissa (horizontal scale) is given in wave lengths in millimicrons and ordinates in terms of relative reflection being expressed in percentages ranging from zero to 100. The film produced by the Razek-Mulder machine gives in addition the characteristic color for each wave length boundary by means of the key

letters at the top of the chart. This little touch makes it somewhat easier to name the characteristic hue from a casual inspection of the distribution curve. It might be noted too that the unequal spacing of wave length boundaries for the different colors is due to the difference in refrangibility of each spectrum hue³, or to express it less technically, is due to the fact that the prism breaks up the colors into bands of differing widths because each hue has a different index of refraction.

The remarkable thing about these spectral distribution curves and the fact which lends stability to the very principle of color analysis is that each curve is unique for a given color sample and that no color samples differing in eye-response could possibly produce identical curves. Repeated tests have proved the converse, namely, that if a color is mixed so as to match a given curve, it will match the original exactly so far as the eye is concerned.

Another interesting speculation is that two color samples mixed independently by different men and

3—See Bibliography at the end of this article.

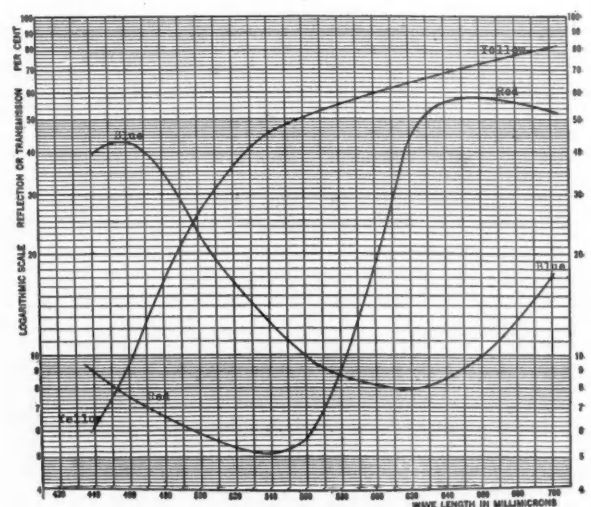


Fig. 4—This illustration shows the spectral distribution curve for certain samples of red, blue and yellow + + + + +

using different proportions and kinds of pigments may conceivably give identical curves, but always if the curves are identical the color samples are identical so far as eye-response is concerned. Analyzing these curves further we find that at zero percentage reflection we have the black boundary, and at 100 per cent the ideal white boundary. In between these boundaries will be located an infinite family of grays and pure grays will be parallel to the horizontal axis. Also an infinite number of curves representing all the variations in color within the range of the human eye.

What then of the practical applications of these color analyzers and how may their use be justified from the economic point of view. This can best be answered by considering the practical problems facing paint technologists and paint manufacturers. First and foremost is the establishment of precise, permanent standards for every color used in the plant. At present the paint technologist must rely on color panels, a rather unsatisfactory proceeding because color samples age and drift with time, the drifting process being inescapable as it occurs to some extent whether the color panel is kept in the dark or exposed to the light. An acceptable color standard would be a boon to the paint manufacturer as it would provide him with precise instructions. Moreover, the use of the machine for final inspection may eliminate the human element involved in color matching and acceptance.

Cooperation between the paint technologist and the paint manufacturer will reduce delays in matching samples, and will reduce rejections with their consequent stoppage of production. Color standards

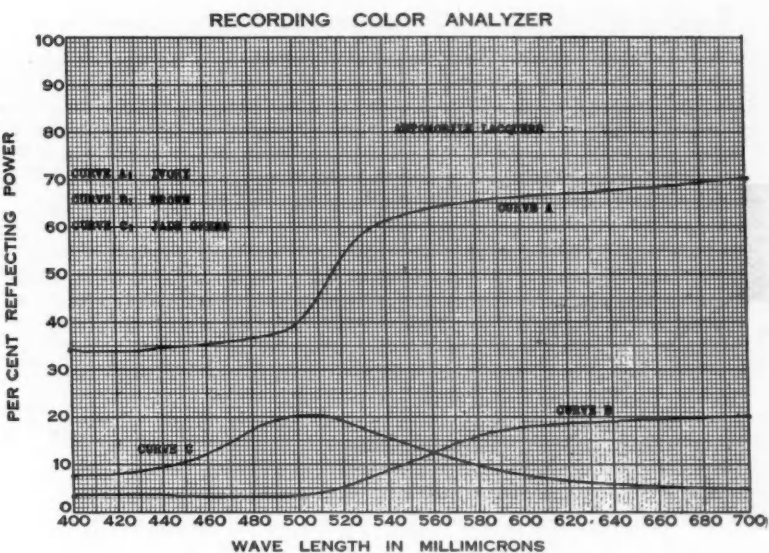


Fig. 5—The color curves shown here were made from samples of lacquer colors especially for this article + + + + +

will make it possible to paint the same make of automobile at widely separated points and yet assure a positive correspondence of color when cars from different points are brought together. It is quite conceivable, too, that hoods, ventilator doors, instrument boards and other matching parts might be completely finished in outside plants and yet properly matched with bodies painted at still another point.

Naturally in using the color analyzer as a production tool it will be absolutely necessary to set up boundary tolerances giving an acceptable working range of variation for any given standard curve. Paul⁴, discusses this in his interesting report, and shows tolerances established for a series of grays,

4—See Bibliography at end of this article.

Table 2

THE light dispersing unit consists of a spectrometer, or rather, of a collimator tube, a prism, and a telescope tube, without any divided scale. It is designed primarily for intensity and not for sharpness of focus. The prism is dense flint glass, having an angle of approximately 60°. Since constant deviation is most convenient, and may be had by one refraction and one reflection, a mirror was introduced as the reflecting surface. The light measuring unit consists of a photoelectric cell and a very sensitive vacuum tube amplifier, usually designated as the Bridge Grid Resistor Amplifier. It may be summarized as follows: The light emerging from the exit slit of the spectrometer is allowed to fall upon the sensitive surface of the photoelectric cell. The current thus generated by the cell is amplified by one vacuum tube. The change in plate current of this vacuum tube flows through a galvanometer, causing it to deflect. The indicating and recording unit consists of a photographic plate holder, a visual scale, a galvanometer, and a beam of light. The plate holder is mounted in vertical guides and can be moved by rotating a small crank. The rotation of this crank also automatically changes the color falling upon the photoelectric cell from one limit to the visible

spectrum to the other, maintains constant purity throughout the spectrum, and compensates for the characteristics of the photoelectric cell. The operation of the instrument is as follows: With both the amplifier and the illumination unit turned on, the galvanometer is adjusted to read zero. Standard white ($MgCO_3$) is then placed over the sample opening and the crank is turned. The sensitivity of the galvanometer is adjusted until the reading is just 100. Then the crank is turned backwards to the end of its path, the sample to be tested is placed in the place of the standard white, and the crank again turned. When the wave length scale reads 400 millimicrons the shutter is opened, exposing the film to the action of the small point of light that comes through the fine horizontal slit. At a reading of 700 the shutter is closed, and the crank is turned back to the end. Now a switch is turned, which throws on a light that prints the coordinates and the identification number on the film, and the record is ready for development. The time required for turning the crank moving the photographic plate holder through its path is five or six seconds. Three or four seconds for coordinates makes a total of ten seconds for a complete record, outside of development.

Table 3

THIS instrument, Fig. 3, developed by American Photoelectric Corporation and built by Elmer and Amend, New York City, uses as a source of light a small incandescent lamp operated by a storage battery. There are, in addition, a spectrometer, a slide carrying a sample to be analyzed by transmitted light, a box containing the photoelectric cell and the greater part of the electrical circuit, one side of the box carrying the control panel, and finally, a Wheatstone bridge of the Kohlrausch type which is balanced with the assistance of a galvanometer. Light from the source enters the spectrometer where a spectrum hand about 5 millimicrons wide is isolated by means of a slit and allowed to fall upon the sample slide. The slide may be moved to three positions. The first permits the passage of no light and enables the operator to adjust the instrument for zero intensity. The second position interposes an unobstructed opening

between the spectrometer and the photoelectric cell, whereupon the operator makes an adjustment for 100 per cent light intensity of the wave length being measured. The third position places the sample in the path of the light. When the bridge is balanced in this position, the reading is a measure of the intensity of the transmitted light in relation to zero and 100 per cent intensity of the same wave length as supplied by the source. The bridge is calibrated to read directly in per cent of total intensity of the light from the source.

To make a reading on any material at any desired wave length, it is necessary only to balance the electrical circuit as above by turning a dial. A sufficient number of readings at different wave lengths are made to enable one to plot an accurate curve of intensity versus wave length over any desired range of the spectrum.

by having a group of some 200 representative consumers of paint compare a standard sample of gray with another sample and determine his range of acceptability. Averages of the result of these tests, Fig. 7, indicate a general rule, "that as a color increases in brightness, greater tolerance may be permitted in the development of a commercial specification based on two parallel spectral distribution curves, representing the light and dark limits within which a reading on a batch paint may fall." Another important generalization is that in this test, "the observer was most critical on the darker limit permitting far greater tolerance on the lighter limit. In the case of the lightest group the condition is reversed and the greatest tolerance is found to be permitted on the dark rather than on the light limit."

In any event, since in any given case the problem of color matching lies between the paint user and the paint manufacturer, they can readily get together and establish mutually acceptable tolerances, remembering of course that the tolerances may be entirely different for every color.

Since many commercial paints weather or drift in color with age, the problem of weathering has many aspects which may be studied to advantage with the color analyzer. And, although the paint manufacturer is more concerned with the problem than the user, there are times when the user's production troubles may be investigated by means of color analysis.

So far as the paint manufacturer is concerned, the color analyzer provides his paint technologist with a definite means of determining the fugitive elements in his mixture. In the automotive plant the technologist will find the solution to some of his complex problems. For example, paint itself sealed in cans will undergo a certain amount of drift if kept in storage for a period of months. By means of the color analyzer, paint samples can be checked before using and the color restored by additions of the indicated pigment so as to match exactly the original standard.

Another example: Assume that due to a sudden change in schedule a large bank of bodies has to be stored for some length of time in completely finished condition. Some of the bodies are near windows and exposed to daylight, others nearer the interior of the building are practically in the dark. At some given time there will be a decided difference in color perceptible to the eye of a good observer and, if the bodies stand long enough, weathering will probably be perceptible even to the untrained eye. Moreover the degree of weathering will vary from body to body depending upon its location with respect to the source of illumination. Now, when the bodies are placed again on the production line, it is necessary to match hoods. And the original standard paint can no longer be safely used. Depending upon the number of bodies involved and upon the actual amount of weathering effect, a number of color samples can be made, analyzed and a representative average sample established. The standard paint can

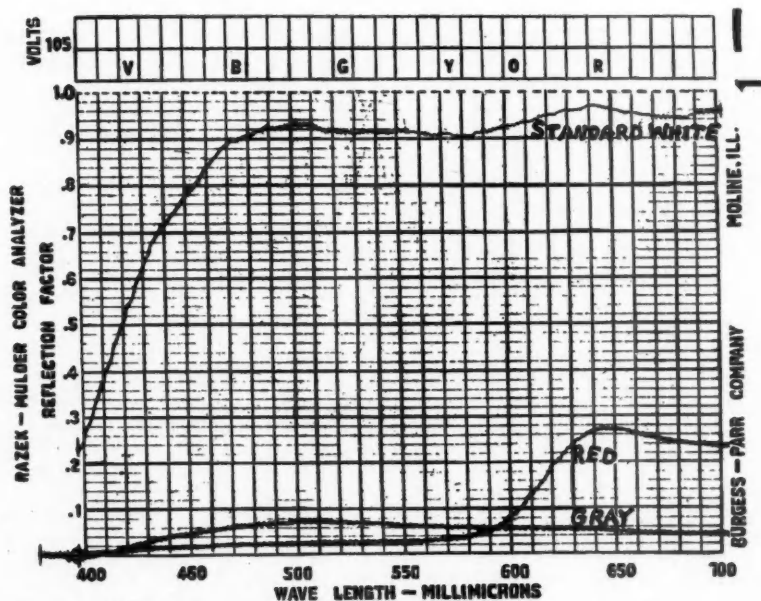


Fig. 6—This reproduction was taken from the photographic film record made by the Raze-Mulder color analyzer + + + + +

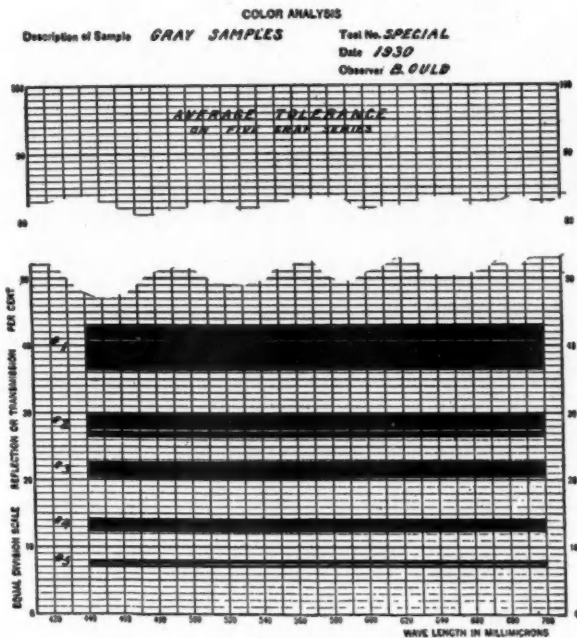


Fig. 7—This is a chart to show the tolerance allowed by several color users + + +

then be remixed so as to conform to the new standard and hoods painted with this new color will, on the average, match the bodies in the bank although the general color tone of the body may differ slightly from those in previous production.

While on the subject of color matching, particularly inspection, it might be well to note an interesting device which is designed to rapidly compare a given color sample against a standard color sample. The instrument is the Colorscope invented by Dr. H. H. Sheldon and is being marketed by the Sheldon Electric Corp. Briefly, this instrument consists essen-

tially of two photoelectric cells which form opposite sides of a balanced amplifying circuit. The difference in the current between these two sides is amplified and the output goes to a galvanometer. Two samples to be tested are placed in front of these cells, one in front of each. If the two samples are identical, the response will be the same in each case provided the cells and all parts of the two branches of the circuit are identical. This is accomplished in practice by compensating for differences by means of a single dial adjustment which gives the desired calibration. This device is, of course, primarily an inspection machine.

Reviewing the function of the color analyzer and the remarkable record which it produces leads one to speculate somewhat upon its future possibilities. For one thing it offers a definite means of standardizing color by providing a basic curve which is unique for each color. Some of the practical problems which it can solve have already been touched upon. Also its uses in coordinating the efforts of the paint user and the paint manufacturer.

For maximum accomplishment, considerable experience will have to be gained by application to many practical problems. Probably the first results to be achieved will be the setting of tolerances of acceptance because the basic curve made by the color analyzer cannot be commercially reproduced with 100 per cent correspondence. Tolerances undoubtedly will depend upon the type and cost of the product, and the quality range.

According to some of the experimenters, after some practice with actual color problems an operator can visualize the general character of the desired color directly from the curve, which seems to be entirely reasonable. At present little is known about the quantitative relation between the proportions of the spectral hues and the reflection coefficients. Per-

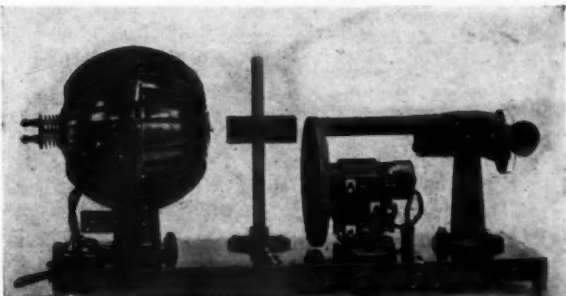
Table 4

THE K. & E. instrument consists essentially of: (See illustration right to left) the constant deviation spectrometer with its wave length scale, the direct reading rotating disk photometer with its photometer scale, the stand with adjustable holder for transparent samples, the light source with its holder for samples when reflection measurements are made.

For reflection measurements the sample is placed in the upper part of the holder on the back of the light source, while a block of magnesium carbonate with a carefully scraped flat surface is placed in the lower part. The spherical housing which is illuminated on the inside by two 400 Watt lamps is ventilated and kept cool by a vacuum ventilator which is furnished with the outfit. The sample holder is so constructed that a stream of cool air passes in a thin space between the sphere and the sample holder and over the sample.

With the sample in position and the instrument in operation, the wave length scale is set for whatever wave length it is desired to read. The top and bot-

tom of the field as seen through the eye slit are then made to match in brightness by turning the knurled cap, on which is the photometer scale, rapidly back and forth. When satisfied with the match the per cent reflection or transmission at that particular wave length is read directly from the photometer scale. It is well to take an average of five such readings. This is repeated for as many points throughout the spectrum as is considered necessary for the particular test being made. For a sample having a fairly smooth curve fewer points need be taken than for one having a steep curve or showing sharp absorption bands.



The K & E is strictly an optical instrument + +

haps the accelerated experience, due to the introduction of these machines in industrial laboratories, will throw some light on this. To stretch the imagination, if such experience values were available, it is conceivable that the proper color could be mixed almost directly from a color curve. At any rate, it is possible right now by definite cut and try methods to produce a color corresponding to a given color curve.

M. Luckiesh of the Lighting Research Laboratory of the National Lamp Works of the General Electric Co. says it is easy to distinguish a difference in brightness of about 2 per cent. Therefore the number of shades of any color that we can possibly produce depends upon the brightness of the original color. Vermilion is an initially dark color, usually reflecting not more than 20 per cent of the light incident upon it. Thus one can distinguish only about 10 shades of it.

Beginning with white one can construct a series of grays numbering about 40 to 50, each one being just darker or lighter than its neighbor. Taking all colors we may say that we can distinguish an average of about 30 shades for each color.

Now let us turn to another factor which has not been mentioned. By mixing more and more white we can produce a series of tints with the pure color at one extreme and white at the other. Taking all colors and shades we may estimate that we can distinguish an average of about 20 tints for each color.

We can distinguish about 150 different hues quite apart from tints and shades. If each of these on an average can be made into 30 shades by adding black and if each of these shades can be made into an average of 20 tints by adding white it is seen that we can distinguish (150 times 30 times 20) about 90,000 colors in the broad sense of the term.

Acknowledgment

Acknowledgment is made to Laurence D. Dubey of Ditzler Color Co., Detroit, Mich.; M. Rea Paul of the National Lead Co., Brooklyn, N. Y.; M. J. Callahan of duPont, Parlin, N. J.; J. Razek of the University of Pennsylvania, and G. F. A. Stutz of the New Jersey Zinc Co., for their helpful suggestions and assistance in connection with this study.

For a critical analysis of the new color analyzers and their relative merits based on the work of the Bureau of Standards, the reader is referred to a letter on the subject dated Sept. 30, 1930, written by Dr. I. G. Priest, Chief of the Colorimetry Section, Bureau of Standards.

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Spectographs and Spectrometers, Bausch & Lomb Optical Co.
The Universal Spectrophotometer, Bausch & Lomb Optical Co.

Table 5

Spectral Hue (Border Lines)	Wave Length (Millimicrons)
Violet	400-446
Blue	446-500
Blue-green	500-515
Green	515-578
Yellow	578-592
Orange	592-620
Red	620-700

K & E Analyzer (descriptive booklet), Keuffel & Esser Co.

The Razek-Mulder Color Analyzer (descriptive booklet), Burgess-Parr Co.

The Light Reflection Value of Color Paint, The New Jersey Zinc Co.

Tints and Shades—What Do They Mean? By M. Luckiesh.

Photoelectric Spectrophotometer, A.P.C. Bull. 101, American Photoelectric Corp.

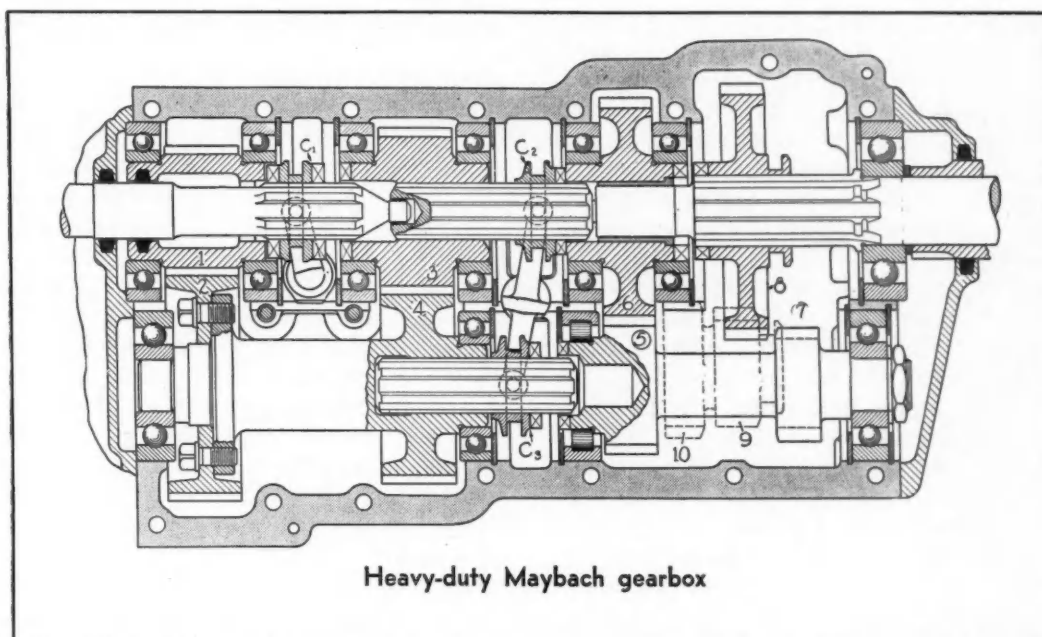
Practical Color Simplified (Vol. 1), by William J. Miskella.

The Principles of Advertising, by Tipper-Hotch-kiss-Hollingworth-Parsons.

A NEW plan for avoiding trouble from failure to cut off the ignition current when accidentally stalling the engine on driving it into the garage, has been worked out by the R. B. Magneto Co. In addition to the regular lead battery, an iron-nickel battery is provided, of 1.5 ampere-hours capacity for 12-volt and 3 ampere-hours capacity for 6-volt systems. This auxiliary battery is connected in parallel with the lead battery and thus is automatically kept charged, but it cannot be discharged because a copper oxide valve is placed in circuit with it, which allows current to flow into it but not out of it. Such a safeguard is evidently of considerable value in countries where charging facilities are less common than here.

CHARLES FAROUX suggests in *La Vie Automobile* that next year's Paris automobile show, which will be the twenty-fifth, should be made a special event and that an automobile congress should be combined with it, at which such questions as automobile tax reform, compulsory insurance, changes in road law, methods of road maintenance, etc., could be discussed. All types of motor-propelled vehicles and even bicycles should be brought together, and he foresees that the Grand Palais would not afford nearly sufficient space, hence the Cours la Reine and the Esplanade des Invalides, adjacent open squares, should be secured. An early formulation of plans is urged.

SPECIFIC instructions for grinding O.K. cutters, hollow mills and other special tools are given in their new circular "Grinding O.K. Cutters," which may be obtained by writing to the O.K. Company, Inc., Shelton, Conn.



New Maybach 5-Speed Gearbox Has 4 Silent Speeds and Pneumatic Control

by Edwin P. A. Heinze

MAYBACH Motorenbau G.m.b.H. of Friedrichshafen a.B. in Germany has introduced a new gearbox with five forward speeds in which gear changes can be effected pneumatically without declutching. The box is being supplied in various sizes for use on heavy-duty vehicles such as buses and coaches, as also for private cars. It constitutes a development of the well-known Maybach over-speed gear introduced two years ago and has the same peculiarly shaped dog clutches, which permit of gear changing without declutching solely by momentarily letting go of the accelerator pedal. The surfaces of the claws are so shaped that they may glide on one another before engaging without danger of breaking or jarring.

The illustration is a section of the heavy-duty gearbox. Gears 1, 2, 3, 4, 5 and 6 have helical teeth and the couples 1-2, 3-4 and 5-6 remain in mesh constantly. Gears 7, 8, 9 and 10 (the latter two being the reverse set) are spur gears. The top shaft is divided into three sections, of which the clutchshaft on the left is piloted in the end of the central section inside the hub of gear 3; the other end of the central section is supported in the hub of gear 6, which latter also supports the end of the driven shaft.

The layshaft also consists of three parts. The left section is supported in ball bearings and has fixed in its right end a splined shaft forming the central section. The other end of the latter is piloted in the third section integral with gears 5 and 7. The third section runs in one roller and one ball bearing.

The lowest speed is obtained by engaging sliding gear 8 with gear 7, clutch C_1 with gear 1 and clutch C_2 with the third section of the layshaft, when the power is transmitted through 1, 2, 7 and 8, which combination offers a reduction ratio of 4.5 to 1. This, however, will not be required normally and the second speed combination will be used for starting, the driving power being conducted through 1, 2, 5 and 6. The clutches remain as they are, but sliding gear 8 is made to engage with gear 6, with which it normally remains coupled. The reduction ratio so obtainable is 3 to 1. Third speed drive is taken through 3, 4, 5 and 6, clutch C_1 being merely slid across to engage with gear 3, when a reduction ratio of 2 to 1 is obtained. To engage the fourth speed, clutch C_1 is again engaged with gear 1, clutch C_2 with gear 6, which connects to the driven shaft through gear 8 (both of these gears having positive-clutch members), while clutch C_2 is disengaged from 5. The drive is then through 1, 2,

4, 3, the reduction ratio being 1.5 to 1. Direct drive is obtained by sliding C_1 from gear 1 into engagement with gear 3, when transmission is from the driving shaft to the central shaft through gear 3 acting as a coupling, and from the central shaft to the driven shaft through gears 6 and 8 coupled together.

All this sounds quite complicated but in reality it is rather simple, since control operations are restricted to three independent moving parts, viz., clutch C_1 , coupled clutches C_2 and C_3 , and the spur gear 8. As the latter is required only for engaging the reverse (which has a ratio of 4.5 to 1), only two shifting parts need to be operated in all ordinary driving.

Operation of the control mechanism has been so simplified as neither to cause confusion nor to require any appreciable amount of physical effort. Second, third, fourth and fifth speeds are engaged by merely setting two small finger levers on the hub of the steering wheel and momentarily letting go of the accelerator pedal, when a simple servo-mechanism of the same type as used in the Maybach over-speed gear, utilizing the vacuum in the inlet manifold, does the shifting. Declutching is said to be unnecessary even at high vehicle speeds, and shifting is said to be effected without noise or jar. All of these speed combinations are

noiseless in operation, owing to the use of helical ground teeth. The low emergency speed and the reverse are operated by a hand lever in the usual way.

With this gearbox a smaller rear axle reduction can be used than with the normal four-speed transmission, so its fourth speed gives about the same road speed as the direct drive with the four-speed transmission, and the fifth forward speed can then be used on level roads to reduce engine speeds.

Maybach Motor Manufacturing Company also has developed a transmission for passenger cars which gives normally four forward speeds, the highest of which is a direct drive. Change between the first, second and third speeds is effected by means of a cane-type lever in the usual way while the change from third to fourth and vice versa is made by means of a vacuum servo without declutching. While the transmission is referred to as a four-speed, the four most-used ratios being 4.63, 2.45, 1.44 and 1:1, two additional intermediate speeds are available, with ratios of 3.21 and 1.7 to 1.

A transmission of this type with a torque capacity of 108 lb.-ft. and a horsepower rating of 45 has an overall length of 13 in. and weighs (with aluminum housing), 57 lb.

Oxy-Acetylene Welding of Strip Chromium Alloys

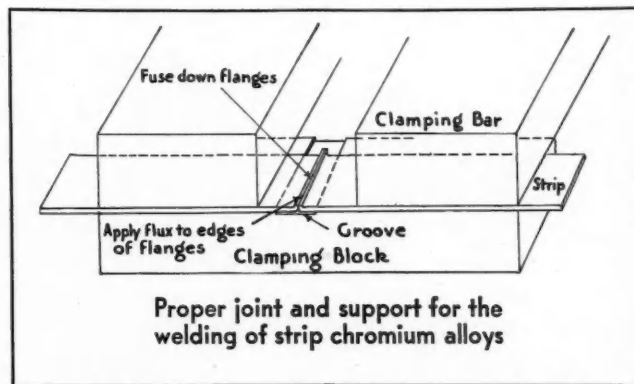
By W. B. Miller

Union Carbide and Carbon Research Laboratories, Inc.
Long Island City

INCREASING use of stainless steels and other chromium alloys for bright metal parts in automobile production has naturally brought about a demand for information as to the correct procedure for welding these newer alloys. Oxy-acetylene welding offers a most satisfactory method for the fabrication of automobile parts from these alloys and the proper procedure for welding is outlined in this article.

The welding of chromium alloys presents certain problems not usually encountered in the welding of ordinary low carbon steel. During the welding operation an infusible refractory slag is formed which, if not removed through the use of a flux, would materially interfere with the proper application of the welding flame. However, with the aid of a suitable flux correctly applied, strip chromium alloys in the lighter gages can be satisfactorily welded.

For thicknesses up to 16 gage, the flange type of weld should be used. The edges to be joined should be flanged or bent up to a height of approximately



1/16 in. These flanges should be cleaned of all oxides and mill scale, and then coated top and bottom with a thin water paste of some flux that is capable of readily dissolving chromium and iron oxides. The flux known commercially as Cromaloy flux is especially well

adapted for this type of work. It is essential that the flux be applied to the underside of the seam in order to insure perfect and clean bottom fusion.

The ends should then be butted together and the flanges melted down with a small, neutral oxy-acetylene flame. No welding rod is required.

To prevent warping, the strip should be clamped to a backing-up strip or block so that it is supported on both sides. The supporting block should have a shallow groove under the seam to be welded so that it is possible for the molten metal to sag far enough to give uniform reinforcement on both sides of the sheet.

The accompanying sketch shows the type of joint and method of support of such welds.

Effect of the Center of Gravity on Skidding Tendencies is Studied

WITH the center of gravity geometrically centered, front-wheel locking exerts a greater retarding force than rear-wheel locking. With front wheels locked a straight path is followed, while any combination of locked wheels unsymmetrical to the center line results in skidding

EXPERIMENTS on the factors that affect skidding have been made at the National Physical Laboratory, England, and are dealt with in a paper read before the Institution of Automobile Engineers by J. Bradley and S. A. Wood. They were made on a rubber-tired, four-wheel model without springing, on a cement floor between which and the rubber tires there was a coefficient of friction of 0.8. Each of the four wheels was fitted with a brake, and the brakes could be applied singly or in various combinations. The model was set in motion by means of a descending weight which towed it a distance of 4 ft. and then released it. In the experiments the path of the center of gravity of the vehicle was traced by a chalk carried in a holder which was allowed to drop to the floor the instant the brakes were applied.

The experiments were divided into four series. Great care was taken in each series to alter only the feature which was being studied, leaving the other three constant. The four series of experiments were as follows:

Series 1—Effect of moment of inertia about the center of gravity.

Series 2—Effect of longitudinal position of center of gravity.

Series 3—Effect of height of the center of gravity.

Series 4—Effect of transverse position of center of gravity.

Some of the results of the experiments merely confirm what is already well known, namely, that four-wheel brakes give the shortest stopping distance, coupled with very little tendency for rotation around the center of gravity; that when the center of gravity is about central geometrically, front-wheel locking exerts a greater retarding force than rear-wheel locking; that a straight path is followed with locked front wheels, as against an extremely uncertain path with

locked rear wheels; that any combination of brakes unsymmetrical about the center line of the vehicle leads to a deviation from the initial direction, and that the deviation and rotation of the chassis are much greater if one front wheel alone is left unbraked than if one rear wheel is not braked.

To determine the effect of the moment of inertia around a vertical axis through the center of gravity on the violence of the skid, tests were made with models of 13 and 9-in. wheelbase. In the first the moment of inertia was changed from 212 to 275 lb.-in.² and in the latter from 143 to 246 lb.-in.² In either case the effect on the amount of rotation of the model was very slight.

Keeping the weight and the moment of inertia of the chassis constant, separate series of tests were made, at each velocity, with the center of gravity at a constant height on the center line of the chassis and at one-quarter, one-half and three-quarters the wheelbase from the front axle. When only the front brakes were applied there was no deviation from the original direction for any location of the center of gravity, and with four-wheel brakes the deviations and rotations were usually so slight as to be negligible. When front brakes only were used, the stopping distance increased rapidly, as the center of gravity was moved toward the rear.

It was found that the position of the center of gravity has a very important bearing on the behavior of the chassis. With the rear-wheel brakes only locked, the effect of moving the center of gravity forward was to lengthen the distance required to pull up and also to increase the amount of deviation and rotation before coming to rest. A further peculiar result was that when brakes were applied to two diagonal wheels, with the center of gravity in the central and front positions, the vehicle deviated in the direction of the locked front

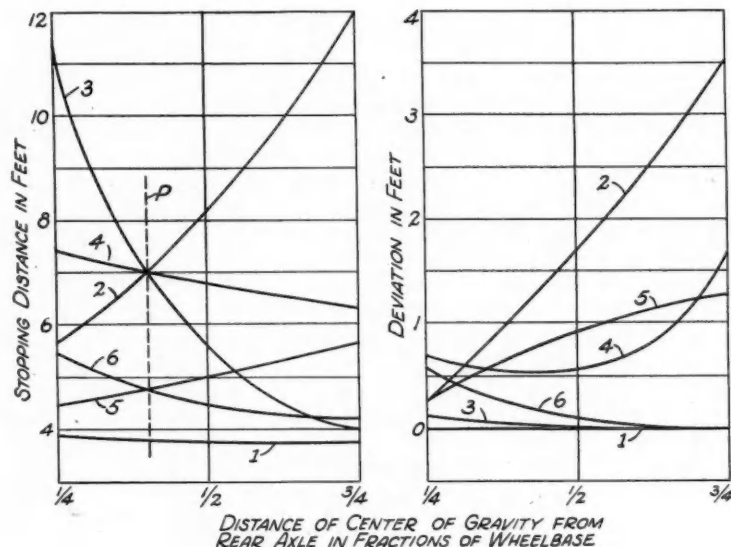
wheel, while with the center of gravity in the rear position the vehicle followed the locked rear wheel, that is, it swerved in the opposite direction. This suggests that with the center of gravity in some position distant more than one-quarter and less than one-half the wheelbase from the rear wheels the vehicle would travel

in a straight line with a diagonal pair of wheels locked. The amount of deviation and rotation was greatest with the center of gravity in the forward position, but the distance traveled forward was then least.

With brakes applied to three wheels there was a definite swerve in the direction of the wheel whose opposite was not braked, for all positions of the center of gravity, but the swerve was much greater when only one front wheel was locked than when only one rear wheel was locked, except when the center of gravity was in the rearmost position.

Considering all of the results in the tests on the effect of longitudinal position of center of gravity, the following conclusions were drawn: Locked rear wheels tend to produce deviation whether used by themselves or in combination with the other brakes. The deviations become greater as the center of gravity is moved forward. As opposed to the effect of rear brakes in producing deviation, the steadying effect of front brakes is very marked. In each case where two front brakes were used the deviation diminished as the center of gravity was moved forward. With the forward center of gravity and the front brakes in use, the rear brakes had only a very slight effect on the deviation as well as on the stopping distance. To insure a minimum amount of deviation, whatever the braking combination, the center of gravity must be near the rear wheels. For the value of the height of center of gravity and coefficient of friction used in this series of experiments, the optimum position of the center of gravity, from a standpoint of deviation due to locking of wheels, is about one-third of the wheelbase from the rear wheels.

Changes in the height of the center of gravity were found to have no marked effect on the path traced by the center of gravity under various conditions. With a high center of gravity there was danger of overturning with all those brake combinations which produced marked deviation. It was concluded that under prac-



Effect of location of center of gravity on skidding tendency + + + + + + + + +

1, four wheels locked; 2, two rear wheels locked; 3, two front wheels locked; 4, one front and diagonally opposite rear wheel locked; 5, one front and two rear wheels locked; 6, one rear and two front wheels locked

tical conditions with actual vehicles the possibility of overturning is remote, because the velocities are relatively lower than in the experiments, and if the coefficient of friction under practical conditions were high enough to prevent sideslip at normal speeds, the vehicle would come to rest before it had acquired sufficient

angular momentum to cause overturning.

The effect of a lateral shifting of the center of gravity was found to be relatively small and could be explained by considering the retarding force exerted by the locked wheels. Where pairs of wheels on the same axle were locked, the effects were the same as if the center of gravity were on the center line. This would be expected, since the moments about the center of gravity of the retarding forces on each wheel remain equal, and the total retarding force is unaffected by moving the center of gravity.

Flexible Glass in Production in France

NEARLY a decade ago reports of a flexible glass having been developed in Germany reached this country, and an item on the subject was printed in *Automotive Industries* at the time. Nothing further was heard regarding the product and the supposition seemed justified that it had been found of no commercial value.

Now the *Allgemeine Automobil Zeitung* carries a news item to the effect that a plant for the production of such glass has been opened in France. The glass, which is being sold under the trade name Similex, is a reaction product of phenol and formaldehyde.

It can be produced in any hardness and any flexibility and is absolutely non-shatterable. At first the product had a yellowish tint, but since only distilled water is being used in its manufacture it is entirely colorless.

The price is substantially the same as for ordinary plate glass, but the weight is only one-third as much. One of the principal advantages of the new glass is said to be that it is completely transparent to ultraviolet rays.

The Forum



Automotive Production as a General Business Index

Editor, AUTOMOTIVE INDUSTRIES:

In the Nov. 8 issue of *Automotive Industries* you presented a statistical resume of automotive progress showing that this industry was like other industries in its "good" and "bad" years, and that business cycles for it did not differ greatly from those which had been used to foretell conditions in other kinds of manufacturing activity. Well enough and true, but there seem to be several other points worthy of note.

While up to about 1923 or later it could be said that the automotive industry "followed" other indices of business activity, the fact that the products of this industry have now become such an essential and integral part of our civilization has given to it the standing of a so-called "key industry" which should be viewed in the light of *leadership* in business activity rather than as a *follower* of what takes place in other fields.

The year 1930 may be taken as the year which conclusively proves this close inter-relationship between things automotive and almost every other activity in which our population engages. At the same time, through a process of careful study and compilation of business facts extending now over a period of more than 10 years, sufficient data are available to make not only past performance stand out as a view free from the mists of inaccuracy and lack of explicit knowledge, but also, I am convinced, to present clear views of what may come as we travel into the future of automotive development. These data show that automotive history repeats itself just as it has been accepted that the history of other forms of business and industrial growth keep pace with recurring cycles of development. I therefore feel that if we consider the automotive industry first and then note the influence it exerts on or relationship it has to other industries, we will not go far wrong. Without wishing to enter into a "hen or egg" argument, I am at least sure that if we follow in detail the "uprisings" and "down-fallings" of the automotive field as a whole (which by the way isn't always done by those engaged in statistical study), we will be able to make some rather close predictions as to what may happen not only in that field, but in other lines of business and industry as well.

Automotive Industries

This brings me to a second point of importance. When we here speak of the "automotive field," we mean far more than the study of the activities of any one or a number of automobile or motor truck manufacturers. The "field" is by no means limited to those activities surrounding the production of complete motor vehicles alone. We mean keeping pace with these of course—*plus* following the activities of component parts, accessory and garage or service equipment makers, *plus* studying conditions in the distribution of not only cars and trucks but all automotive products as well, *plus* noting the relationship of these with the usual statistical data such as vehicle registrations, vehicles annually discarded or junked, fuel and tire consumption, etc.

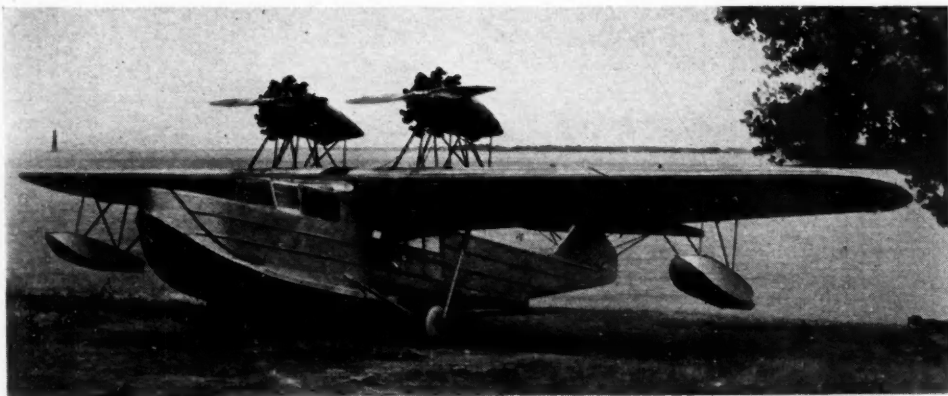
As has been stated frequently, the automotive field is now all these and more, and to know and follow it means obtaining and compiling facts relating to all its ramifications. Nothing less is now sufficient. Yet we know from the nature of inquiries received from time to time that too little attention is being paid to those groups outside the strict automobile production group. Of course it goes without further remark that once reliable statistical material is available it must be interpreted and used correctly. Not that this is not always the intent either, but it is necessary to develop along with the data certain methods of statistical procedure which make the data most comprehensive and readable. At the same time, and try as we will to obtain reliable information of a statistical nature, it is not always as accurate as it might be, so that any interpretation of it must in turn involve a consideration of its possible errors and inconsistencies. Therefore, in using the statistical material we do present, it is essential that no improper or incorrect inferences be drawn from it.

EDMUND B. NEIL

Director of Research, Chilton Class Journal Co.

(Mr. Neil has been asked to prepare for publication a statistical presentation of the point he makes, based upon research material he has developed. The first of this series will appear in the Dec. 13 issue of *Automotive Industries*.—EDITOR.)

December 6, 1930



The Towle Amphibion TA-3 is a high wing cantilever monoplane of unusual wing construction + + +

All-Metal Amphibion Plane Built Without Spars or Ribs

WHAT is claimed to be the first all-metal amphibion granted an approved type certificate by the Department of Commerce is announced by the Towle Aircraft Co. of Detroit. Designated as the TA-3, it is a larger and modified edition of the Towle amphibion exhibited at the Detroit Aircraft Show last April.

It is a high wing cantilever monoplane of unusual wing structure, with accommodations for eight, including the pilot, and powered by two Packard Diesel engines of 225 hp. each. List price is \$32,500, flyaway Detroit. Ventilation is secured through adjustable ventilators located over each passenger's seat; windows are of plate glass, and provision has been made for either a baggage or toilet compartment in the rear of the main cabin.

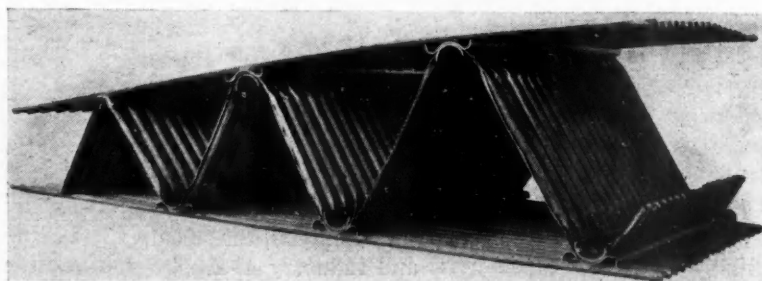
The all-metal Towle wing may be said to have no spars, ribs or bays, being virtually built up of a multiple truss of double corrugated Alclad sheets, extending from wing tip to wing tip. The corrugated sheet, as may

A Few of the Specifications

Span	56 ft.
Length, overall	42 ft.
Cruising speed	100 m.p.h.
Top speed	125 m.p.h.
Landing speed	65 m.p.h.
Service ceiling	12,000 ft.
Take-off (water)	12 sec.
Take-off (land)	12 sec.
Fuel capacity	90 gal.
Oil capacity	13 gal.
Chord at tip	66 in.

be noted from the illustration, is flattened where it is sandwiched between the male and female stringer. The whole unit, the outer skin, the female stringer, the sheet forming the truss, and the male stringer, are riveted together in one operation. The outer skin is also of Alclad dural, and is designed to take some of the stress. All surfaces, inside and outside, are coated with corrosion-resisting paint to afford protection especially against salt water.

The tail surfaces include three rudders, three fins, a single elevator and an adjustable stabilizer. The landing gear of course is retractable, and is made of steel tubing, the lower strut telescoping into the upper, the latter being connected to the wing through shock chord. The



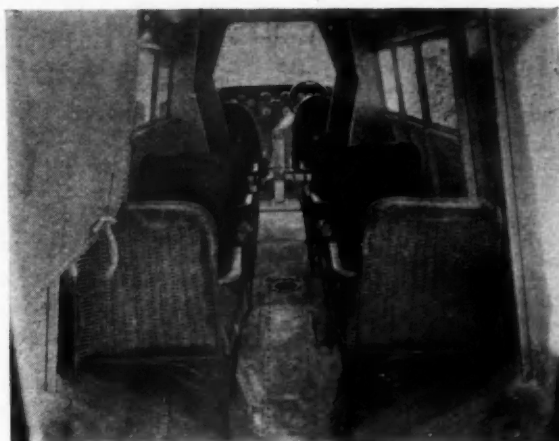
The wings are built up of a multiple truss of double corrugated sheets + +

A view of the watertight hull of the Towle, looking forward toward the pilot's compartment + + + + +

wheels are locked in the up or down position by a nickel steel pin, which is so mounted that it is in full view of the pilot. The mechanism for raising and lowering the gear is operated through cables connected to a hand crank located above and behind the pilot and mechanic's seats. Shatter-proof glass is used in the pilot's cockpit.

The hull is divided into five watertight compartments, each having longitudinal and transverse bracings for maximum rigidity. All seams are of the lap type having between them tape soaked in marine glue, and riveted together by double rows of round head rivets, $\frac{1}{8}$ in. in diameter and spaced $\frac{3}{8}$ in. between rows of $\frac{3}{4}$ -in. pitch. The keel is treble riveted.

Officers of the Towle Aircraft Co. are: George Holley, president; Tom Towle and Eugene Lewis, vice-presidents; Chas. T. Bush, treasurer, and J. H.



Failing, secretary. The directors include C. H. Wills, Clarence Booth, Earl Holley, C. Haines Wilson, Frank Blair, of Detroit, and Harvey Williams of Air Investors, New York.

All-Steel Truck Cab Has Streamlined Cowl

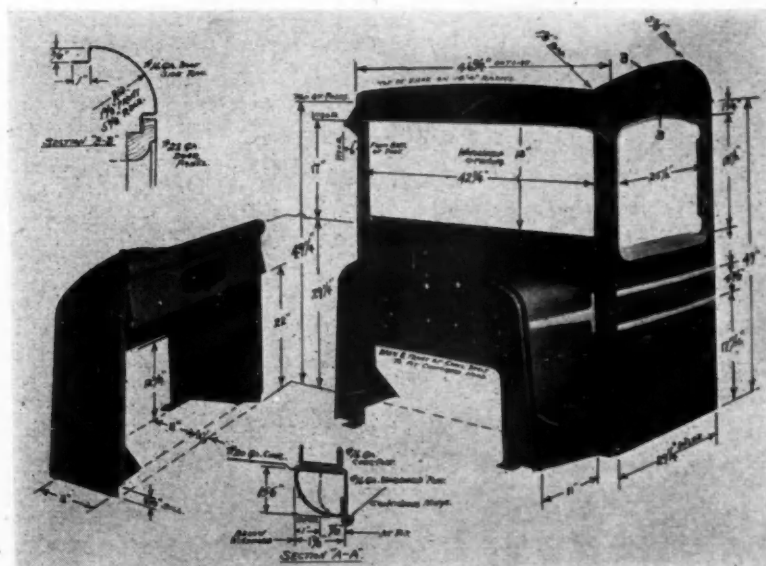
A NEW all-steel truck-cab-panel assembly is being offered to the truck and commercial body industries by the Kirk & Blum Mfg. Co. of Cincinnati, Ohio. As shown by the photograph reproduced herewith it includes a streamlined cowl stamping with tapered molding to match the hood molding at the front, spreading at the back to match up with the molding in the door panel; a steel dash-panel designed to fit the hood and other chassis requirements, steel toe-board supports, and a combination windshield filler panel and instrument board. The cowl assembly is sold either to the body builder as part of the cab equipment or direct to truck manufacturers as part of the standard chassis equipment.

The cowl illustrated is designed to take posts outside of the cowl, but the cowls can be made also with recesses for the posts on the inside. The windshield posts are quarter round in cross-section, are built entirely of pressed steel, and can be equipped with either continuous hinges as shown, or with interior sockets for coach hinges. These posts are equipped with welded steel sill and top brackets, and nuts in internal pockets to match bolt holes in the cowl assembly.

The door panel shown in the illustration is built for a $29\frac{1}{4}$ -in. wood door frame and has an arched top window opening with recessed reveals and

rounded corners. The company, however, has twenty-one different window-opening dies and can furnish one-piece door panels of any size and with pressed-in moldings of any type and arrangement.

The sun visor is of the one-piece cadet type, including a forwardly inclined extension which covers the front edge of the roof deck, bringing the body color across the front and eliminating the necessity of stretching top material around the front of the deck.

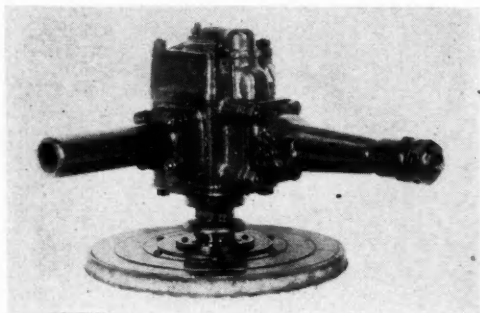


This new all-steel truck cab is offered by the Kirk & Blum Mfg. Co.

NEW DEVELOPMENTS—AUTOMOTIVE

Thor Rotary Pneumatic Sander

A ROTARY pneumatic sander, No. 260S, of the center spindle type has been placed on the market by the Independent Pneumatic Tool Co., Chicago, Ill. Among its most important uses in automobile body plants are for dressing welded



seams and removing high spots prior to the sanding operation; and in general foundry work, such as cleaning castings, etc.

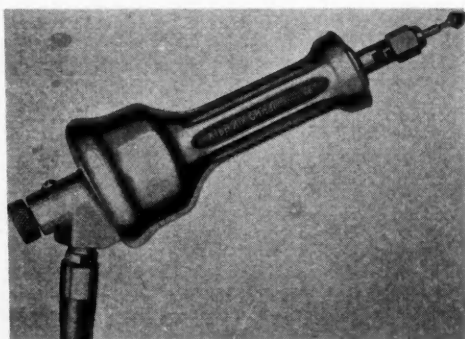
An outstanding feature is the governor, which acts two ways. When the sander is at peak load, the governor automatically opens the throttle and admits as much air as necessary to do the job efficiently. When the motor is running idle, the governor automatically decreases the air consumption, thus saving wear and tear on the moving parts.

The speed of the Thor 260S sander is 4500 r.p.m. Weight, less wheel or disk, is 10 lb. Length overall is 8 in.

Madison-Kipp Air Grinders

THE Madison-Kipp Corp., Madison, Wis., has recently announced the addition of three new ball bearing, high-speed models to its line of air grinders. These new models operate at speeds of 60,000 to 100,000 r.p.m.

Model BBL is a low pressure grinder, designed to develop 60,000 r.p.m. on 30 to 50 lb. air pressure. Model BB also operates at a speed of 60,000 r.p.m., but requires pressures of 50 to 100 lb.

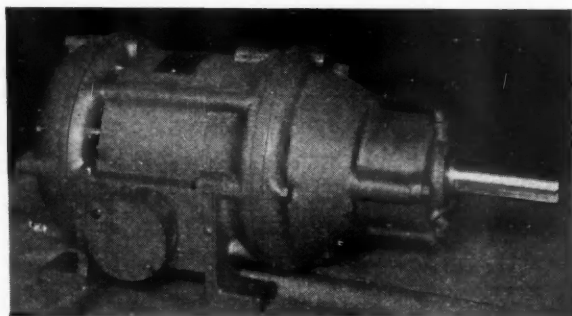


Model BB-100 requires 100 to 120 lb. pressure, and operates at 100,000 r.p.m. Each of the models is small enough to be held in the hand, like a fountain pen.

To reduce the friction incident to these high speeds, these models are equipped with ball bearings at both top and bottom. Lubrication is through the spindle, which is hollow and cross-drilled with 1/32 in. holes. Oil is introduced at the end of the hollow spindle by means of a syringe oiler; centrifugal force delivers it to the bearings through the holes in the spindle.

Self-Contained Motorized Speed Reducers

THE Production Equipment Co., Cleveland, Ohio, is now manufacturing Motorized Speed Reducers in capacities up to and including 20 hp. The unit consists of a standard heavy duty elec-



tric motor with integral planetary gear reduction unit mounted in an oil-tight housing.

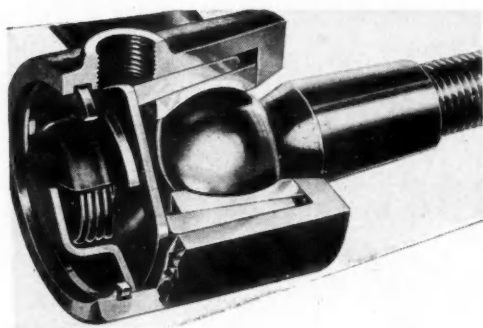
All motors are built by The Production Equipment Co. and can be supplied in single speed, multi-speed, enclosed and high torque designs for either horizontal or vertical mounting. The Motorized Speed Reducer provides an efficient straight-line drive with final driving speeds as low as 50 to 550 r.p.m.

Autocentric Tie-Rod

THE Columbus Auto Parts Co., Columbus, Ohio, has announced a tie-rod with a new type of connector to which the name Autocentric has been given. The connector automatically makes adjustment for any wear that may occur on its bearing surfaces, and the ball remains concentric with the socket of the connector at all times, which characteristics it is intended to express by the name.

The design of the connector is plain from the cutaway photograph reproduced herewith. We

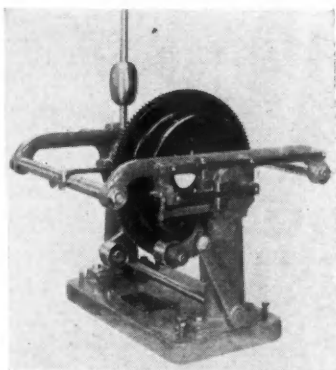
PARTS, ACCESSORIES AND PRODUCTION TOOLS



are informed that the tie-rod has been under development for a number of years, and the manufacturers claim they accomplished what they set out to do, namely, to develop a tie-rod that would take up wear automatically and not be weakened by the automatic feature. It is claimed for the rod that it can be used indefinitely without servicing, requiring only the usual periodical lubrication. Several large manufacturers who have had the rods under tests are said to have approved them.

Static Balancing Machine

A NEW static balancing machine for rotating parts has been developed by Jenkins Machine Co. and will be manufactured by Zencromatic Co., Sheboygan Falls, Wis., a subsidiary of Jenkins Machine Company. The machine not only indicates the amount of unbalance of the part but also its exact location.



The principle of this machine is that a knife edge is located at the axis of the part to be balanced, and when an unbalanced part is placed on the machine, it tips slightly to one side. The part is then turned over in the direction of the tipping of the scale beam until the scale is in balance. The heavy side of the part is then directly below the knife edge.

It is claimed that the use of this machine results in a higher degree of accuracy than the old method of balancing on parallel ways. A work arbor is not required; the part to be balanced is turned or finished on the outside and is placed on four rolls, the axes of which are in line with the center of the knife edges, so as to bring the work to be balanced in line with the knife edges.

After the heavy point of the part has been located, the latter is turned by hand through an angle of 90 deg., and while it is in this position the sliding weights are adjusted to effect a balance of the beams. This shows how much material has to be removed to balance the part, and if weight is removed for balancing at a certain distance from the axis and by means of a drill of a certain size, the weights will have a certain relation to the depth and number of holes required to effect balance of the part.

In cases where weights are added to effect the balance, a weight pan is provided on a bar which can be fastened at the same radius as that at which the balancing weights are to be located.

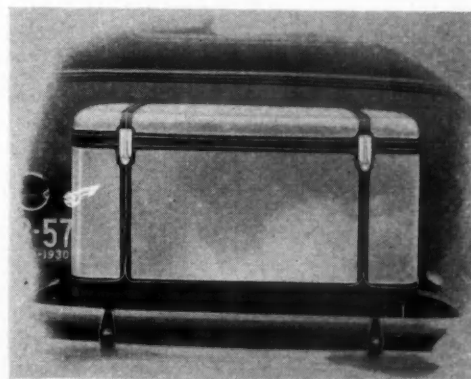
The standard machine is made for parts of 20 in. diameter and in several sizes accommodating parts from 7 to 31 in. in width. For high-speed production on flywheels the machine is made with a drill-press attachment. The machine is said to be specially adapted for determining the unbalance of tires, ring gears, etc., that cannot be placed on standard arbors.

The carrier is made in one type with all sides plain, for roadsters and coupes; and in another with a curved back that follows the lines of limousines or sedans. Special De Luxe models, with handles and chromium-plated molding strips, will also be available.

Fostoria Luggage Carrier

A LUGGAGE CARRIER known as the Fostoria Presteel is being placed on the market by The Fostoria Pressed Corporation of Fostoria, Ohio. It has wide embossed moldings, pressed out of the steel wall; a continuous piano-type hinge, the parts of which also are formed right out of the steel walls, and rivetless construction throughout, even down to the special Corbin locks.

The cover is crowned slightly. The bottom is of wood, and the sides are lined with fiber com-



position. A rubber gasket between cover and body is said to make it rumble-and-dust-proof.

The carrier is made in one type with all sides plain, for roadsters and coupes; and in another with a curved back that follows the lines of limousines or sedans. Special De Luxe models, with handles and chromium-plated molding strips, will also be available.

Automotive Oddities—By Pete Keenan

BLIND MAN EXPERT AUTO MECHANIC

HARRY ERICKSON OF
BLOOMER, WISCONSIN. LOST
HIS SIGHT 15 YEARS AGO.
HE IS REGARDED AS THE
MOST SKILLED
MECHANIC IN THE
DISTRICT.

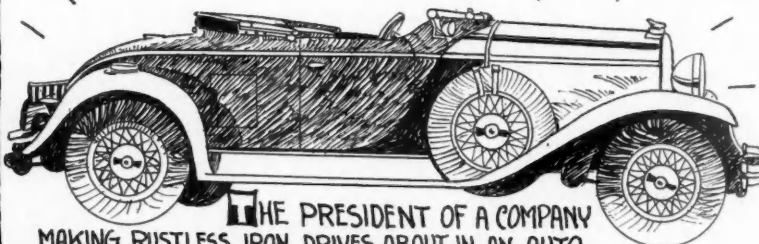


BETTY CARSTAIRS,
ENGLISH SPEEDBOAT RACER,
SPENT HALF A MILLION
DOLLARS TRYING TO WIN
AN INEXPENSIVE CUP
(THE HARMSWORTH TROPHY)

OPERATORS LICENSE

OUT OF THE 32,000,000
LICENSED DRIVERS IN U.S.A
22,000,000 ARE IN STATES
THAT DO NOT REQUIRE
EXAMINATIONS.

GLENN SMITH CLAIMS HE WAS
THE FIRST FLYING POSTMAN. HE
LEARNED TO FLY IN 1914 BEFORE THE
AIRMAIL WAS STARTED
St. Petersburg, Fla.



THE PRESIDENT OF A COMPANY
MAKING RUSTLESS IRON, DRIVES ABOUT IN AN AUTO
OF WHICH ALL THE DECORATIVE PARTS ARE MADE OF THE NEW MATERIAL.



NEWS OF THE INDUSTRY

Retail Financing Holds High Level

Dept. of Commerce
Reports Figures to
Sept. 30 of This Year

WASHINGTON, Dec. 4—Retail financing of new and used motor vehicles for the first nine months of this year reached a volume of \$1,013,609,954, according to figures supplied today by the Department of Commerce. This figure compares with a volume of \$1,322,221,486 reached during the first nine months of 1929.

Wholesale financing for the first nine months reached a volume of \$560,136,996 this year, as against \$547,213,232 for the first nine months of last year. The average amount placed at retail financing was \$413 per car for the period ending Sept. 30.

Shorter Leaves Durant

LANSING, Dec. 4—Harry J. Shorter, sales manager of Durant Motors, Inc., since last July, announced his resignation here this week. He has been in the automobile sales field for 16 years and since May, 1923, with the Durant organization. Mr. Shorter declared that his plans for a new connection had not been completed.

Ayres to Make Annual Talk

CLEVELAND, Dec. 4—Col. Leonard P. Ayres, vice-president of the Cleveland Trust Co. and internationally known business expert, will address the members of the Cleveland Automobile Manufacturers and Dealers Association at their Dec. 16 meeting at the Hotel Cleveland.

Thompson Gets Opel Order

CLEVELAND, Dec. 3—Thompson Products, Inc., announces receipt of orders from the Opel Motor Works of Germany for 5000 eccentric tie rods and 5000 drag links, according to Charles E. Thompson, president.

Shipment will start immediately to be used in January production of a six cylinder Opel car.

Chevrolet Exceeds Nov., 1929

DETROIT, Dec. 4—November production of Chevrolet cars and trucks was 47,257 units, compared with 46,125 units for November of last year. The December schedule calls for 60,000.

The News Trailer

By Herbert Hosking

Liquor, twilight and bad brakes are the motorist's enemies, says W. T. Palmer, manager Russell's replacement sales . . . yeah . . . bad liquor, bad light and bad brakes * * * Dr. Miller Reese Hutchison, mem. S.A.E., crashed the papers this week with a new platinum wire monoxide eliminator . . . wonder if he ever heard of Siemens-Halske in Berlin . . . he could've made it automatic too * * *

J. M. Bonbright, Graham publiciter in pre-McManus days, is back with Brooke, Smith and French, who now have the G-P account * * * R. H. Grant, G.M. sales-head, will speak at Detroit ad-crafters 25th Anniversary meeting on program with Henry Ewald, founder (Dec. 5) * * * Silenzio, silenzio, signores! . . . the next speaker on this evening's program will be S. A. Excellenzio Guillermo Marconi, on the Plymouth World Tour Program * * * "The doors for genius and originality in the automobile industry are certainly wide open"—Faulkner of Auburn speaking. * * * Christiano Heyn Haymann of Rio Janeiro got himself released from a vow never to drive an automobile, and then purchased a Ford town sedan * * * Edna May Day of the German Grand Opera Co. got the first of the new Chevrolets to come off the line * * * the Smithsonian will get the Texaco Eaglet glider in which Capt. F. M. Hawks was towed last Spring from San Diego to N. Y. * * * gimme a set of checkers, is the latest cry in front of the tool cribs at the G.M. truck plant at Pontiac . . . new lunch hour diversion for the boys . . . hammers and other mayhemish devices ought to be returned first * * * E. P. Chalfant of the N.S.P.A. sailed for Bermuda Nov. 26 * * * fifteen years to pay, are the terms of the latest instalment selling contracts . . . for locomotives . . . locomotives live longer . . . nothing said about trade-ins * * * Miss Marjorie Durant flies her own * * * a large automobile manufacturer will be among the advertisers in the new Sears-Roebuck catalog, under new Sears policy admitting outside space buyers * * * Pardon me while I drop a few stock certificates in the waste basket . . . what companies? . . . Never mind!

Driver Legislation To be Introduced

Safety Responsibility
Bill is Sponsored
by A.A.A.

WASHINGTON, Dec. 4—With 44 legislatures scheduled to convene early in 1931, enactment of the Safety-Responsibility Law for the control of the reckless and irresponsible driver, now in effect in 12 states, will be the outstanding national issue from the standpoint of motoring legislation.

In making this announcement today, the American Automobile Association, which sponsored the Safety-Responsibility Law, declared that the demands for copies of the law in its newly revised form disclose nation-wide interest and that it would be introduced in whole or in part in the majority of the legislatures where it has not already been enacted, while it is expected that Congress will put it into effect for the District of Columbia.

Reo Ships 1181

DETROIT, Dec. 2—Reo Motor Car Co. shipped 1181 cars and trucks in November, compared with 1221 in November, 1929.

Difficulties in obtaining certain supplies curtailed production during the month causing unfilled orders to accumulate to the extent of about one-half of one month's production. These difficulties have been overcome and a larger production is expected in December.

Steel Prices Hop Up

NEW YORK, Dec. 4—An advance of \$1 per ton on prices for bars, shapes and plates was announced by the Carnegie Steel Co., shortly before the close of the markets last night. Other producers shortly followed suit in increasing prices, in a movement which signalized the first definite market advance in several months.

Stanley Motors Formed

WILMINGTON, DEL., Dec. 4—The Stanley Steam Motors Corp. obtained a charter from the Secretary of State at Dover, Dec. 1. The corporation will have an authorized capital of 500,000 no-par shares. Incorporators are H. E. Grantland, C. S. Peables and L. E. Gray.

White Cuts Salaries; Workers Not Affected

Company Maintains Nearly Full Force

CLEVELAND, Dec. 3—The White Co., which was one of the first in this locality to adopt the stagger system, has maintained practically its entire force of employees throughout the year. They are now working on a three-day basis.

As announced by George H. Kelly, vice-president and treasurer of the company, the organization cut the salaries of its officers and salaried employees 12 per cent. This took effect of Dec. 1. None of the regular plant workers were affected.

The company is organized to increase its production at any time. Early orders received by the company the first of the month indicate that December will probably be a better month than either October or November.

Muskegon Merger Operative Now

CHICAGO, Dec. 4—Merger of the Houdaille-Hershey Corp. and the Muskegon Motor Specialties Co. has been declared operative, 170,999 shares of the latter company's common stock having been deposited for exchange. Holders of the additional Muskegon common stock may deposit their holdings on or before Dec. 15. It is expected that an offer will be made by Houdaille-Hershey Corp. for the 62,500 shares of Muskegon Class A stock, acquisition of the senior issue likewise to be accomplished through an exchange of shares.

Juan de la Cierva Sails

PHILADELPHIA, Dec. 3—Juan de la Cierva, inventor of the autogiro, sails at midnight tonight on the S. S. Aquitania from New York for England, where he will spend two days before crossing to Paris, as the Spanish Government's delegate to the International Safety Congress, which will open in Paris, Dec. 15.

Senor de la Cierva has been in America since Nov. 11, as the guest of Harold F. Pitcairn.

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Ceylon Registrations Reported Increased

COLOMBO, Nov. 4 (*by mail*)—24,350 motor vehicles were registered and in use in Ceylon on Sept. 30, this year. Of this number 15,027 were motor cars and cabs, 3515 motor cycles, 2976 lorries, vans, etc., and 2667 omnibuses.

The United States was the biggest supplier, nearly half the total number being imported from that country. The United States supplied 11,217 vehicles, the United Kingdom 8401, Canada 2319, France 1080 and Italy 1023.

In September, 1930, alone the number of vehicles imported was 117, of which 75 were motor cars or cabs. Fifty-five of the total number were imported from America and 38 from the United Kingdom.

Post Office Dept. Seeks Bids on Air Service to Europe

WASHINGTON, Dec. 3—Air mail communication between the United States and Europe comes much nearer to practical realization with the announcement by the Post Office Department that bids will be received for carrying the mails for aircraft for a 10-year period to begin June 31, 1931.

Bidders for the service must be citizens of the United States and the postmaster general reserves the right to specify that aircraft use shall be of U. S. manufacture. Quotations are to be on a mileage rate, with a base load of 300 lb. Loads in excess of this are to be figured on a poundage basis.

No limitation is placed upon the type of aircraft to be used except that it shall be of approved design. Bids will be received until 12 o'clock, noon, of Dec. 29, at the office of the second assistant postmaster general in Washington.

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Airport construction announcements for the two weeks reached more than \$3,500,000, with one \$1,000,000 project at Kankakee, Ill.

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Frederick H. Klie, New York, architect, plans \$100,000 multi-story repair and service garage.

Harry G. Bach, New Brunswick, N. J., architect, plans \$100,000 repair and service garage.

Republic Aircraft Corp., Chicago, Ill., planning new airplane manufacturing plant at Kankakee, Ill. Entire project to cost \$1,000,000. R. Levine & Co., Chicago, architects.

Little Rock, Ark., municipal airport commission plans \$100,000 extension to reconditioning and service facilities of airport. E. E. Stansberry, City Hall, in charge.

U. S. Rubber Co., plans expenditure of \$2,000,000 to manufacturing facilities in Detroit.

Oshkosh Motor Truck, Inc., has been incorporated to take over operations of Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis. Production is being resumed.

Port Arthur, Tex., city council considering airport and seaport development, including reconditioning and repair shops.

Indianapolis, Ind., city council plans \$75,000 bond issue for completion of municipal airport reconditioning shop. City engineer in charge.

Advance-Rumely Co., La Porte, Ind., has taken over plant and business of Indiana Farm Machinery Corp., and plans extension of manufacturing activities.

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(a) Loans to states to supplement funds already appropriated or to be appropriated by them for the construction of roads, with the understanding that these monies are not to be used as a substitute for funds now or hereafter available and that the state shall not divert any special motor vehicle taxes from road construction;

(b) Further appropriations from the Federal treasury under the terms of the Federal Aid Highway Act to improve farm roads and approaches to cities and grade crossings;

(c) Appropriations for improvement of forest roads; and

(d) The removal of the present limitation of Federal aid participation to \$15,000 per mile to permit the Secretary of Agriculture to participate up to 50 per cent in the cost of highways.

USL Sales Make Record

NIAGARA FALLS, N. Y., Dec. 1—USL replacement sales for September and October exceed any two months of any year in the history of the company, according to officials of USL Battery Corp.

To Manufacture New Tube

LOS ANGELES, Dec. 1—Manufacture of the new "air container," puncture sealing automobile tire inner tube developed by the B. F. Goodrich Rubber Co., began in the Pacific Goodrich Co. plant here today.

Klemm Gets Receiver

NEW YORK, Dec. 1—The Aeromarine Klemm Corp., aircraft manufacturer of Keyport, N. J., has been placed in voluntary receivership in order to conserve assets and settle financial difficulties. William L. Dill, former Motor Vehicle Commissioner for the State of New Jersey, has been appointed receiver.

Railroad Profits From Truck Division

CHICAGO, Dec. 2—Operation of Wilson Transportation Co., owned by the Chicago, St. Paul, Minneapolis & Omaha railway, a subsidiary of the Chicago & North Western, will show a profit for 1930, Carl R. Gray, Jr., vice-president and general manager of the Omaha road and chairman of the board of the Wilson company, announces.

Mr. Gray bases his decision on results so far this year. Cost of repairs, tires, tubes and other accessories has been taken into consideration, he said, and charged off on a mileage accrual basis, creating a reserve for depreciation. Two hundred towns in Minnesota and North Dakota are rendered this truck service, which is a primary corollary to that of the railroad and in a very few instances a duplication.

Exactly how much the road has gained in the way of recaptured less-than-carload revenue through the purchase of its largest highway competitor is not available, but it is pointed out that before acquisition of the trucking firm in September last year, the railroad lost freight in five months that would have brought \$70,000 revenue if shipped by rail. For a year the loss probably would have been around \$160,000.

Petroleum Imports Rise

NEW YORK, Dec. 3—For the week ending Nov. 29, 1930, the American Petroleum Institute estimates gross imports of petroleum at the principal United States ports totaled 2,231,000 bbl., a daily average of 318,714 bbl. This compares with 2,055,000 bbl., a daily average of 293,571 bbl. for the week ended Nov. 22 and a daily average of 264,500 bbl. for the four weeks ended Nov. 29.

Daily average gross crude runs to stills for the week were approximately 2,345,000 bbl. based on estimates received from 95.7 per cent of the total producing capacity reporting and 62.9 per cent operation.

Jordan Reports Loss

NEW YORK, Dec. 4—Jordan Motor Car Co., Inc., reports net loss for the nine months ended Sept. 30 of \$677,083 after all charges. This compares with profit for the corresponding period last year of \$133,041. Loss for the September quarter was \$231,712, compared with loss for the corresponding quarter last year of \$18,097.

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The oil and motor industries as represented at last night's gathering, generally opposed any attempt to level the advantages of all transportation agencies through punitive regulations or burdensome taxes.

Oil executives expressed their readiness to cooperate with the general promotion work which the National Automobile Chamber of Commerce is doing in foreign countries.

The following automobile representatives attended the session:

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H. F. Sinclair, President, Sinclair Co.
Axtell J. Byles, President, Tide Water Associated Oil Co.

W. M. Irish, President, Atlantic Refining Co.
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White Co. Declares

CLEVELAND, Dec. 3—The White Co. has just declared a quarterly dividend of 50 cents a share payable Dec. 31 to stock of record of Dec. 12. The White Motor Securities Corp., the company's financing organization, has declared a dividend of \$1.25 on its preferred stock for the quarter.

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Gasoline Consumption in September Increased 5.2 Per Cent, Compared With Same Month of '29

NEW YORK, Dec. 3—Gasoline consumption in 47 states for the month of September, 1930, as indicated by reports made by wholesalers and dealers in the various states, under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,256,025,000 gal., compared with 1,193,858,000 gal. in September, 1929, an increase of 62,167,000 gal., or 5.2 per cent. Daily average consumption for September, 1930, was 41,868,000 gal., compared with a daily average of

43,345,000 gal. in August, 1930, a decrease in daily average during September of 3.4 per cent.

Gasoline consumption in 45 states for the nine months ending with September, 1930 (Illinois and New York not being included for the reason that comparative figures for the year 1929 are not available), amounted to 8,337,186,000 gal., compared with 7,814,787,000 gal. for the corresponding period of 1929, an increase of 522,399,000 gal., or 6.7 per cent.

GASOLINE CONSUMPTION BY STATES, SEPTEMBER, 1930, Etc.

	Tax Per Gallon Cents	Month of		9 Months Ending With	
		Aug., 1930 Gallons	Sept., 1930 Gallons	Sept., 1930 Gallons	Sept., 1929 Gallons
Alabama	4	15,717,000	14,675,000	15,765,000	131,203,000
Arizona	4	6,192,000	6,276,000	6,113,000	57,099,000
Arkansas	5	12,552,000	12,765,000	13,538,000	105,616,000
Colorado	4	18,360,000	16,693,000	14,218,000	132,646,000
Connecticut	2	22,875,000	20,508,000	19,310,000	168,316,000
Delaware	3	4,466,000	3,361,000	3,049,000	27,449,000
D. of C.	2	7,155,000	6,946,000	6,322,000	58,862,000
Florida	6	16,599,000	16,348,000	15,552,000	170,363,000
Georgia	6	21,114,000	19,799,000	15,438,000	168,947,000
Idaho	5	7,223,000	6,790,000	6,139,000	46,899,000
Illinois	3	94,920,000	89,282,000	84,768,000
Indiana	4	43,825,000	42,647,000	40,545,000	346,253,000
Iowa	3	37,614,000	37,572,000	33,354,000	297,353,000
Kansas	3	36,573,000	36,039,000	34,204,000	302,288,000
Kentucky	5	16,588,000	15,624,000	14,990,000	126,257,000
Louisiana	4	15,960,000	15,919,000	16,225,000	136,671,000
Maine	4	15,151,000	12,623,000	11,445,000	81,823,000
Maryland	4	16,986,000	16,635,000	15,469,000	130,381,000
Massachusetts	2	55,199,000	50,390,000	47,167,000	404,536,000
Michigan	3	79,736,000	73,776,000	75,252,000	601,857,000
Minnesota	3	43,158,000	41,227,000	35,381,000	305,075,000
Mississippi	5	† 12,574,000	† 11,740,000	12,517,000	† 105,116,000
Missouri	2	40,087,000	40,516,000	37,833,000	327,196,000
Montana	5	8,436,000	10,486,000	11,272,000	65,009,000
Nebraska	4	21,530,000	21,222,000	18,142,000	173,710,000
Nevada	4	1,976,000	1,889,000	1,878,000	14,217,000
New Hampshire	4	8,843,000	6,998,000	6,752,000	49,898,000
New Jersey	2	55,645,000	50,050,000	44,111,000	410,498,000
New Mexico	5	5,441,000	5,154,000	4,281,000	40,903,000
New York	2	157,629,000	142,343,000	128,398,000
North Carolina	5	20,469,000	22,806,000	24,091,000	183,781,000
North Dakota	3	17,399,000	14,290,000	14,150,000	98,050,000
Ohio	4	97,693,000	81,084,000	94,845,000	739,346,000
Oklahoma	4	29,446,000	30,149,000	28,408,000	246,355,000
Oregon	4	17,737,000	16,779,000	15,983,000	130,333,000
Rhode Island	2	9,247,000	8,266,000	7,326,000	66,168,000
South Carolina	6	10,976,000	10,724,000	10,347,000	88,545,000
South Dakota	4	15,211,000	14,393,000	11,621,000	108,243,000
Tennessee	5	21,111,000	20,090,000	19,179,000	161,080,000
Texas	4	73,283,000	72,707,000	67,321,000	603,876,000
Utah	3½	5,895,000	5,464,000	5,440,000	46,578,000
Vermont	4	6,355,000	5,334,000	4,962,000	35,343,000
Virginia	5	22,887,000	20,738,000	19,568,000	169,710,000
Washington	3	27,593,000	25,759,000	24,036,000	208,097,000
West Virginia	4	14,585,000	14,561,000	12,901,000	104,673,000
Wisconsin	2	49,359,000	42,898,000	40,875,000	332,208,000
Wyoming	4	4,328,000	3,690,000	3,377,000	28,359,000
Total		1,343,698,000	1,256,025,000	1,193,858,000	8,337,186,000
Daily Average		43,345,000	41,868,000	39,795,000	30,539,000
Increase over previous year:					
Amount of Increase			62,167,000		522,399,000
Percentage Increase in Daily Average			5.2%		6.7%
		Quarter Ending		9 Months Ending With	
		June 30, 1930	Sept. 30, 1930	Sept. 30, 1929	Sept. 30, 1929
California	3	347,735,000	357,199,000	334,457,000	1,000,395,000
Pennsylvania	3	206,486,000	251,874,000	280,021,000	662,460,000
†—Estimated.					

Copper Prices Creep Toward Higher Level

Other Metal Markets Reflect Seasonal Quiet

NEW YORK, Dec. 4—Because it was the only metal that underwent any price change this week, copper was once more in the limelight. Custom smelters through successive advances of ¼ cent per lb. at a time, brought their price more into line with the 12-cent level, which continues to be looked upon as the "semi-official" quotation of the large producers. On Tuesday, virtually no copper was obtainable at below 11½ cents, delivered Connecticut, and 11½ cents, delivered Middle West, an advance of ¼ cent per lb. over last week's average price.

Market gossip has it that considerable cheap copper has been picked up by the fabricating subsidiaries of the large producers, so as to relieve the market. Whether this be true or not, the market wears a much brighter face and is firmer all around. Some of the foreign producers who attended the recent conferences in New York corroborated the general curtailment of production policy adopted at these meetings upon their return home, and stated that retrenchment in output had been put into actual effect. Similar announcements continued to come from domestic producers.

Typical first-half of December conditions prevail in the market for steel products. Current operations of finishing mills continue at a rate commonly referred to as 40 to 50 per cent of capacity. Every one is on tiptoes as to how soon first quarter 1931 demand will begin to make itself felt. Taking all in all, a fair volume of small lot orders continues to come to finishing mills from parts-makers and other automotive consumers. The general impression in the market is that the price situation has been cleared up through the recent announcements of the leading interest's subsidiaries.

Pig Iron—Somewhat more brisk demand from automotive foundries in the Middle West is reported. Prices remain unchanged, slight concessions in highly competitive markets continuing, however, when a round tonnage order is the objective.

Aluminum—Quiet and unchanged.

Tin—Firm, with Straits tin offered at 26 cents at the beginning of the week.

Lead—Routine conditions prevail. Fairly steady.

Zinc—Foreign zinc cartel negotiations have broken down. The domestic market is a shade firmer.

"Vega" Has Larger Capacity

DETROIT, Dec. 2—Increase of the pay load and gross load of the Detroit Lockheed Vega has been approved by the Department of Commerce, according to a recent announcement by Detroit Aircraft Corp. The Lockheed is now licensed for a gross weight of 4500 lb. which allows for increased gasoline capacity, more baggage allowance, and extra equipment, such as landing lights, flares, and radio.

Reo of N. E. Formed

DETROIT, Dec. 1—Reo Motor Co. of New England, of which Charles R. Dunbar is president and Dwight T. Hersey general manager, has taken over the distributorship of Reo passenger cars, speed wagons and trucks in eastern Massachusetts. Headquarters of the company will be 870-872 Commonwealth Ave., the former loca-

tion of the Linscott Motor Co., which becomes an associate of the Reo Motor Co. of N. E., with salesrooms and service facilities at 29 Brookline Ave., Boston.

Mr. Dunbar, president of the new company who, in 1912, purchased the Boston factory branch of Oakland, has handled the Oakland and Pontiac lines until recently.

Reo Offers Improved Trucks at Lower Price

Range Begins at \$895
For 129-in. Wheelbase Job

LANSING, Dec. 4—New truck models, improved in appearance and performance, and ranging in price from \$895 up, the lowest in Reo history, are announced this week by officials of the Reo Motor Car Co. The new models are known as the improved 3-ton Speedwagon, with 163-in. wheelbase, and the Super-tonner, 129-in. and 135-in. wheelbases. All are equipped with stake bodies.

The Reo super-tonner, in both lengths of wheelbase is furnished with a standard four-speed transmission and a rear axle adapted for mounting dual wheels, at \$1,095. Other improvements include full-chromium plating of the radiator, heavier fenders, running boards and hood fasteners, and large new hub caps with the Reo emblem.

The rear axle now accommodates dual wheels and is provided with very rugged axle shafts, the diameter of which increases from 1½ in. at the splined inner end to 2¼ in. at the wheel end where it is supported in two tapered roller bearings mounted back to back.

The new transmission for the super-tonner has four forward speeds and one reverse, the low gear ratio being 6.57 to 1, which, with a final drive ratio of 5.2 to 1 gives ample rear axle torque for extreme conditions. The Reo engine is retained unchanged in the new super-tonner.

Marked changes in the appearance are features of the heavier models. They have massive new full-chromium radiators extending above the hood and protected by six heavy chromium finished bars, fastened with acorn nuts at top and bottom. These vehicles carry full-chromium-plated head lamps and heavier fenders and running boards. A wide range of new color combinations is being offered. The 70 hp. Reo Gold Crown engine is continued in these new jobs.

The cab has been improved with respect to comfort and appearance. New trim is used in the seat and back. There are full-chromium cowl lights in the 2-ton and 3-ton series and chromium in the 1-ton and 1½-ton jobs add to the appearance. Heavier hardware is used throughout. The retainer which holds the shatterproof glass windshield in place is also chromium-plated.

An inside sun visor and pockets are provided.

Rolls-Royce is Confident

NEW YORK, Dec. 3—Rolls-Royce of America, Inc., faces 1931 with the utmost confidence that it will surpass in sales the moderate year it has experienced in 1930, and the excellent normal years of 1928 and 1929, in the opinion of W. E. Hosac, vice-president.

EVENTS DURING NEW YORK SHOW WEEK

Auto. Merchants Asso., Pre-Show Dinner, Commodore	Jan. 2
Pierce-Arrow, Luncheon, Plaza Hotel,	Jan. 3
International Registration, N.A.C.C. Office	Jan. 3
Franklin Mfg. Co., Luncheon, Commodore	Jan. 5
Packard Motor Car Co., Luncheon, Roosevelt, 12.15 noon	Jan. 5
Nat'l Auto. Dealers Asso., Meeting, Commodore	Jan. 5
International Luncheon, N.A.C.C. Office	Jan. 5
Hupp Motor Car Co., Luncheon, Commodore	Jan. 5
International Trade Conf., Meeting, N.A.C.C. Office	Jan. 5
Rubber Manufacturers Asso., Dinner, Commodore	Jan. 5
Metropolitan Section S.A.E., Dinner, Commodore	Jan. 5
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Roosevelt, 12.30 noon	Jan. 6
Auburn Automobile Co., Luncheon, Commodore	Jan. 6
Hupp Motor Car Co., Luncheon, Commodore	Jan. 6
Nat'l Auto. Chamber of Com., Banquet, Commodore	Jan. 6
Marmon Motor Car Co., Luncheon, Commodore	Jan. 7
Hupp Motor Car Co., Luncheon, Commodore	Jan. 7
Nat'l Auto. Chamber of Com., Directors' Meeting, N.A.C.C. Offices	Jan. 7
Federal Distributors, Meeting, Commodore	Jan. 7
Federal Distributors, Dinner, Commodore	Jan. 7
Motor & Equipment Asso., Dinner, Astor	Jan. 7
Chevrolet Motor Co., Dinner, Commodore	Jan. 7
Willys-Overland Co., Banquet, Commodore	Jan. 8
Olds Motor Co., Dinner, Hotel Astor,	Jan. 8
Hupp Motor Car Co., Luncheon, Commodore	Jan. 8
Overseas Automotive Club, Dinner	Jan. 8

EVENTS DURING CHICAGO SHOW WEEK

Chicago Auto Trade Asso., Pre-Show Dinner, Congress	Jan. 23
Pierce-Arrow, Luncheon, Stevens	Jan. 26
Franklin Mfg. Co., Luncheon, Blackstone	Jan. 26
Hupp Motor Car Co., Luncheon, Stevens	Jan. 26
Nat'l Auto. Dealers Asso., Meeting, Palmer House	Jan. 26
Hupp Motor Car Co., Luncheon, Stevens	Jan. 27
Federal Distributors, Meeting, Stevens	Jan. 27
Federal Distributors, Banquet, Stevens	Jan. 27
Nat'l Auto. Dealers Asso., Banquet, Commodore	Jan. 27
Auburn Automobile Co., Luncheon, Stevens	Jan. 27
Packard Motor Car Co., Luncheon, Blackstone, 12.15 noon	Jan. 27
Nat'l Asso. of Show & Asso. Mgrs., Luncheon, Palmer House, 12.30 noon	Jan. 27
Hupp Motor Car Co., Luncheon, Stevens	Jan. 28
Nat'l Auto. Chamber of Com., Directors' Meeting, Stevens	Jan. 28
Marmon Motor Car Co., Luncheon, Palmer House	Jan. 28
Olds Motor Works, Dinner, Congress	Jan. 28
Willys-Overland Co., Banquet, Palmer House	Jan. 29

Cleveland Show Plans Shaping

CLEVELAND, Dec. 3—The Cleveland Automobile Manufacturers and Dealers Association is busy with plans for the 1931 Cleveland Automobile Show to be held at Public Auditorium Jan. 24-31 inclusive. Herbert Buckman, secretary and manager of the association, looks forward to an enthusiastic week with attendance figures running high. A country club background is being planned for the exhibits and considerable space will be allotted to the products of accessory and parts manufacturers.

Memphis Lumber in Better Demand

Body Plants Operating
At Fairly Steady Rates

MEMPHIS, Dec. 2—Despite the arrival of real winter, December lumber mill operation in this territory promises to be better as production had been fifty per cent of normal and both domestic and export trade shows recent improvement.

Quartered white and red oak continue active in the market, ash is fairly active, and gum in low grades is quiet, but there is some demand in finishing stock.

Wood-body building plants have taken on several thousand new employees in November and December and are expanding rather than retrenching; this applies to two concerns making wood bodies here and at other points, also to the Ford Motor Co., Memphis branch.

Body building plants in the bus and vehicle trade are quite active here, employing more men, and while output is not very large they are steady in operation, more so than in 1928 or 1929.

Hercules Reports Profit

CHICAGO, Dec. 1—Hercules Motor Corp.'s net profit for the 9 months ended Sept. 30 was \$543,000 after all charges including depreciation and Federal taxes, equal to \$1.74 a share on 312,500 shares of no par common stock. Earnings for the third quarter amounted to \$177,000, compared with \$254,296, or 81 cents a share in the preceding quarter.

Buick Ships 7177 Units

FLINT, MICH., Dec. 3—Shipments of the Buick Motor Car Co. during the month of November totaled 7177 units, compared with 11,171 for the month of October and 9761 for the month of November, 1929. Because of adjustment of inventories on hand, the December production schedule calls for only 4100 cars, according to an announcement made today.

Berrien Named to Show Staff

PHILADELPHIA, Dec. 4—William P. Berrien has been appointed to assist W. H. Metcalf in the management of the Philadelphia Automobile Show. Mr. Metcalf has been manager of the show for many years but recently has been ill. He is reported as being on the way to recovery. Mr. Berrien was formerly second vice-president of the Roberts-Nash Co., Philadelphia.

Louisville Plans Big One

LOUISVILLE, Dec. 2—The 1931 Automobile Show to be held by Louisville Automobile Dealers Association takes place Jan. 19-24 and will be on a more elaborate scale than former shows.

Truck and Replacement Parts Sales Bolster Foreign Automotive Markets

WASHINGTON, Dec. 4—Brief surveys of conditions in 11 foreign automotive markets during the third quarter will be presented in the Dec. 15 issue of *Commerce Reports*, by A. W. Childs, chief of the Automotive Division, Bureau of Foreign and Domestic Commerce. This is the second group of a series, and completes a summary of 21 markets undertaken by foreign representatives of the Automotive Division and the Department of Commerce. The first series of 10 was printed in *Automotive Industries* for Nov. 22 (p. 779) and appeared in *Commerce Reports* for Nov. 24. The 11 market descriptions in the second and final series appear below. Detailed information about any of the countries mentioned may be obtained by firms or individuals listed in the Exporter's Index, from the Bureau of Foreign and Domestic Commerce, automotive division.

Argentina

Imports of all type cars were downward during the July-September period of 1930. Medium priced cars suffered the greatest decrease followed by low and high priced vehicles. Sales were said to have been in excess of imports, consequently stocks at the end of the quarter were at a more normal figure with relation to anticipated business.

Truck sales in the interior were few and but little better in the city of Buenos Aires. Imports were 69 per cent lower than in the third quarter of 1929 with low priced models especially affected. Purchases by the railroads continued, particularly in Mendoza, evidencing the determination of the rail lines to regain with trucks and buses the traffic lost to independent automotive competitors. A notable increase took place in the accessories and garage equipment business.

British Malaya

Sales in general have fallen off during the third quarter as compared with those of the same period in 1929. Passenger car sales were greatly decreased in Singapore and Penang, during August, but increases were noted in sales figures for Ipoh and Kuala Lumpur.

Used car sales were almost equal to new car sales, due chiefly to the numbers of private owners who were sacrificing their cars for cash. Many Europeans, most of whom are car owners, are unemployed.

Truck sales declined to a lesser degree than those of passenger cars, most of the trade being secured by two light makes of North American manufacture. Sales of the heavy duty type trucks were not encouraging during the quarter.

Finland

The automotive market in Finland during the third quarter was extremely dull. It is estimated that 70 per cent of all sales were trucks and buses. Repossessions were reported to have increased the stocks of used cars to around 2000, as compared to an estimated total of 700 at the end of the second quarter. Six hundred used cars are believed to

be in stock at Helsingfors, 200 in Abo and 1200 scattered throughout the country.

Low priced passenger cars continued to lead in sales volume and very few medium and high priced cars were sold during the quarter. In the truck market sales were normal. Dealers, however, anticipated a diminution of sales with the coming of cold weather. In 1929 there was an unusual demand for trucks during the winter on account of the abnormal lack of snow throughout the country.

France

Production in the French automobile industry was irregular during the third quarter. Peugeot was the only important manufacturer who kept up with 1929 output. Sales of American cars declined during the summer months, principally due to the recession in business conditions.

The truck market continued to be brisk throughout the quarter and constituted the brightest spot in the industry. Total registrations of commercial vehicles was considerably higher than in 1929. The most popular types were the light models, and American manufacturers benefited by the increased demand. Imports of trucks for the first 6 months of 1930 totaled 1724 units as compared with 450 in the same period of 1929.

Most of the motorcycle imports continued to originate in Belgium with England a distant second. More American motorcycles were being sold in the country than in any time in the last five years. The figure is still a small one, amounting to 42 units during the opening half of 1930 as against 11 for the corresponding period of 1929.

Sales of American replacement parts were limited, while accessories were meeting severe competition from local manufacturers. The market for American garage equipment is said to have a comparatively good future in France, and a number of American firms were reported as securing an appreciable volume of business.

Greece

A seasonal revival in the automotive trade during the second quarter continued throughout the summer months. Total sales, however, were considerably below the record figures attained in the

1929 quarter. Registration statistics show that 477 new motor vehicles were sold in the Athens Piraeus district during the months of July, August and September, a decrease of 50 per cent as compared to the total for the same months of 1929.

The demand for trucks has been very satisfactory. Usually the third quarter is the best selling season for trucks, as at this time large quantities of vineyard products are transported from the surrounding provincial districts to Athens and Piraeus.

Sales of parts and accessories were seasonally active. Dealers in Athens reported sales in the entire country as satisfactory. However, it was also reported that the financial standing of many importers of these products was far from satisfactory.

Hungary

Dealer retrenchment continued throughout the quarter and while imports and sales were still far below the 1927-29 average, progress in the reduction of stocks on hand had a salutary effect. New cars thrown on the market at cut prices after dealer liquidations of last year were slowly being worked off.

Unofficial registration figures for the third quarter showed that sales of automotive vehicles were only 40 per cent of those during the corresponding quarter of 1929. Passenger car sales totaled 280, trucks 93, and motorcycles 380. American makes accounted for 40 per cent of the passenger car sales and 45 per cent of the truck sales.

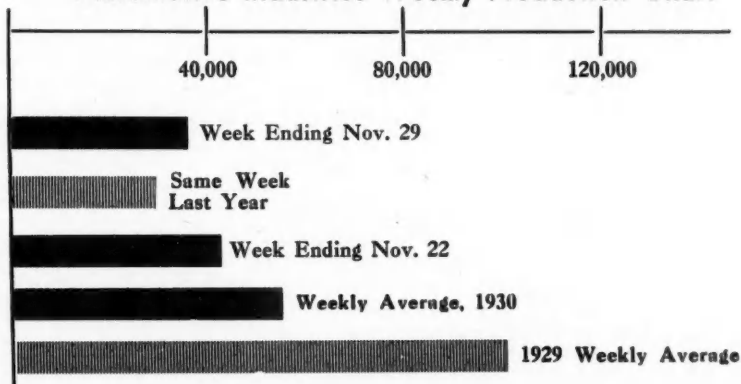
Netherlands

New car business was generally satisfactory up to the end of the half year, but the third quarter saw greater difficulties. Stocks accumulated and factory commitments had to be reduced. Many former high price car buyers dropped to the medium price class, sales in this group thereby having been maintained at previous levels. Competition was very keen, most sales involving trade-ins.

Truck sales fell off, but not to the extent of passenger car sales. American makes have taken a larger share of total business, due in part to the introduction of several low priced vehicles.

New business in motorcycles has been generally satisfactory and sales quotes have been well maintained. American

Automotive Industries Weekly Production Chart



During Unstable Third Quarter of 1930

makes were reported as holding their own, but the light weight British machines continued to gain favor over the Belgian makes. Sales of French and German motorcycles decreased.

Netherland East Indies

The great decline of commodity prices seriously affected native buying power. Imports of passenger cars, however, during the third quarter were 1957 units as compared to 1402 during the previous quarter. Imports of trucks likewise increased with the total number of units being 950 against 665 in the second trimester.

Retail sales of passenger cars showed some improvement during the quarter. Many dealers broke retail prices in order to move cars, while others maintained retail prices but allowed higher trade-in values.

Used cars presented a serious problem as the number of repossessions showed a monthly increase. Several dealers have been shipping used cars to outer possessions in order to move surplus stocks. A large percentage of repossessions were from taxi operators, an indication that this business has also suffered a loss, due to economic conditions.

Porto Rico

In Porto Rico the third quarter is usually the poorest in the year from an automotive market point of view. Sales of new cars and trucks dropped off from 638 units in the second quarter to 516 in the July-September period. Low priced cars led in demand.

The used car situation was particularly encouraging. Dealers' stocks were low and a policy of conservatism toward trade-in values greatly benefited the automotive market.

Of the total new registrations during the quarter, 66 were trucks. Light units have been favored even more strikingly than light cars with 67 of the new truck registrations composed of light weight models. The demand for trucks is expected to improve in the near future when sugar centrals and fruit growers start filling their requirements.

Turkey

Automotive imports for the third quarter of 1930 were only 35-40 per cent of those for the corresponding quarter of 1929. Bonded stocks in the customs warehouses were also much lower than during the third quarter of 1929. Toward the end of September there appeared to be a demand for medium priced cars from taxi interests, due largely to the publication of a municipal decree providing for the circulation of a uniform model of taxicab in Istanbul within two years.

Following the seasonal spring demand for trucks during the second quarter, there was a considerable decrease in July and August. With few exceptions sales of truck chassis were made up entirely of 1½ ton units. There are indications that the demand for 2-ton chassis will increase gradually.

United Kingdom

Passenger car sales and production went downward during the summer

months. The bulk of sales were in the low powered class, ranging from 8 to 15 hp. American competition in the truck field was very strong although imports from the United States have fallen off to a very marked degree. The use of trucks by farmers, commercial firms, municipalities and railways is definitely on the upward trend, and as this field has been only partially exploited, it is expected that the demand for trucks will increase greatly as business attains normal proportions.

In the motorcycle trade, competition is being felt from manufacturers of the very small types of cars. Energetic steps have been taken by some manufacturers to broaden their market through advertising commercial motorcycles for delivery and other purposes, but with only indifferent success. It is believed that the raising of the age limit from 14 to 16 years for motorcyclists under the new traffic law is certain to cut sales to some extent.

Tackle the Sahara With Diesel Cars

PARIS, Nov. 24 (by mail) — Three Laffly Diesel automobiles left Paris recently on a scientific government-subsidized expedition into the Sahara desert, to last four months, during which 8000 miles will be covered.

A Junkers-type heavy-oil engine, built by the Societe Lilloise des Moteurs, which is a branch of the Peugeot organization, is being made use of on the Laffly trucks. It has two vertical cylinders of 80 by 150 mm. bore and stroke, with two opposed pistons in each cylinder, thus giving an effective stroke of 300 mm., and develops 45 hp. at 1200 r.p.m., for a total weight of 1012 lb.

Carrying six men and a useful load of 4000 lb., the automobiles weigh 13,200 lb. in full running order, and will have a range of action under Sahara conditions of 1250 miles. Their mileage varies between 12 and 18 miles to the gallon. As each carries 100 gal. of crude in the main tank and in drums attached to the running boards, the radius of 1250 miles is a minimum under adverse conditions.

The outstanding advantage of the use of a heavy oil engine for this work is that no loss by evaporation has to be provided for. When crossing the Sahara by gasoline automobile it is customary to allow 30 to 50 per cent loss by evaporation, thus necessitating the establishment at heavy cost of a chain of gasoline stations.

Harold W. Hayes Dies

DETROIT—Harold W. Hayes, 35 years old, sales engineer of General Motors Truck Corp., died Nov. 17, at his home in Royal Oak, Mich. Mr. Hayes, previous to joining General Motors Corp., was chief engineer of Dodge Brothers.

Traffic Congestion Is Far Off, Says Engineer

Scientific Study Would Increase Street Area

PHILADELPHIA, Dec. 1—Although we are accustomed to speaking of "congested" street areas in metropolitan centers, as a result of modern vehicular traffic demands, virtually none of our streets have become traffic saturated to the extent of their potential use, according to Hawley S. Simpson, research engineer, American Electric Railway Association. Speaking before a traffic symposium held here recently under the joint auspices of the Philadelphia Section, American Society of Civil Engineers, and the Engineers' Club of Philadelphia, Mr. Simpson pointed out that scientific study and regulation of traffic could be made to increase the present capacity of most traffic arteries, and also their future possibilities.

In describing the economic loss to the nation resulting from faulty traffic conditions in the large cities, Mr. Simpson reiterated that a sum of \$30 is added to the cost of living of each person in the United States, because of these conditions. He pointed out that a recent study in San Francisco showed that local hauling cost amounted to as much as 50 per cent, in figuring the cost of a commodity to the consumer.

In downtown districts, he estimated, it cost the community \$5 or more daily for each car occupying parking space on the streets. This figure was arrived at by figuring the value of the surface land area occupied by the car, and the interest on this at 6 per cent.

The extent to which interstate buses will be used in the future is directly dependent upon the extent to which city traffic authorities will cooperate in getting the buses in and out of cities on schedule, according to Carl W. Stocks, editor of *Bus Transportation*, who discussed the relation of buses to the traffic problem, on the program with Mr. Simpson.

In creating a new and efficient vehicle for mass transportation—the motor bus—the automotive engineer has added considerably to the difficulty of the traffic problem, and it is logical that he should be called upon to have some part in the solution of the problem, according to Mr. Stocks. The engineers and not the police authority will finally solve it, he said. Central bus terminals, designed by architects who seek the cooperation of traffic authorities, bus engineers, and bus operators, will have a large part in solving the traffic difficulties of bus transportation, he added.

The traffic symposium was organized by Burton W. Marsh, traffic engineer of the city of Philadelphia, and was attended by leading engineers and traffic authorities from all parts of the country.

Men of the Industry and What They Are Doing

Pratt & Whitney Promotes

Benjamin H. Gilpin, service manager of the Pratt & Whitney Aircraft Co., has been appointed factory manager, according to Don L. Brown, recently elected president of the local aircraft engine manufacturing concern. T. E. Tillinghast, executive engineer, Mr. Brown said, was elected a director of the company and will have charge of all outside engineering activities under A. V. D. Willgoos, chief engineer, who heads the engineering staff. While succeeding Mr. Brown as factory manager, Mr. Gilpin will also retain his duties as service manager. J. L. Bunce of the service department has been appointed assistant service manager.

Other promotions, Mr. Brown said, included the appointment of Arthur Brooksbank as assistant to auditor Andrew Hart, who has been put in charge of all accounting activities. R. Dimery has been appointed factory accountant succeeding Mr. Brooksbank, who will also continue to function as office manager.

Smith Succeeds Fletcher

J. Gilmore Fletcher, managing director of the Horace E. Dodge Boat and Plane Corp., has resigned and has been succeeded by Kenneth M. Smith, director of sales. Mr. Smith, in addition to active management of the company, will continue to direct the sales from New York headquarters.

The directorate of the company now consists of Horace E. Dodge, president; William M. Horn, secretary and treasurer; Kenneth M. Smith, managing director and director of sales; Hugh Dillman and Anna Dodge Dillman.

To Visit N. Y. Show

W. T. Grose of Wilcot (Parent) Co., Ltd., London, England, and Eric Milner, automotive equipment manufacturer of Birmingham, England, are coming to this country to attend the International Day activities at the New York show. While here they will make a study of accessories and garage equipment which might be distributed in England, as well as automotive equipment which can be manufactured there.

de la Cierva is Honored

Juan de la Cierva, inventor of the autogiro, in speaking at a luncheon tendered in his honor by the Spanish Chamber of Commerce in New York recently, predicted the day when the autogiro will be used commercially to carry loads of six or seven tons at speeds upwards of 200 miles an hour.

Most of the guests at this luncheon were leaders in American aeronautical industry. Other speakers included Charles L. Lawrance, president Wright Aeronautical Corp.; Edward P. Warner, former assistant secretary of the Navy for aeronautics, and Major Lester D. Gardner, former president of the Aeronautical Chamber of Commerce.

Pierce Names Nicodemus

Pierce-Arrow Motor Car Co. has announced the appointment of C. R. Nicodemus as general service manager, succeeding Fred J. Wells, who has been named to take over the duties of service manager of the Pierce-Arrow commercial car division. Mr. Nicodemus has been with Pierce-Arrow approximately two years as assistant to B. H. Warner, vice-president in charge of manufacturing.

In 1915, Mr. Nicodemus was sent to Russia by the Studebaker Corp. of America to take charge of motor maintenance for the Russian government. Following his return from Russia, he held several positions with the Studebaker organization. In 1926 he was appointed service manager of the Studebaker Corp. of Australasia, Ltd., with headquarters in Sydney, Australia.

Groehn Returns to Clayton

Otto J. Groehn returned to the Clayton & Lambert Mfg. Co. on Dec. 1 to become its vice-president and general manager.

Mr. Groehn was with Clayton & Lambert for ten years until the Hudson Motor Car Co. absorbed the former's metal stamping department in 1925, after which until recently he continued with Hudson.

Graham Succeeds Smith

Roy B. Graham has been appointed manager of battery sales, United Motors Service, with headquarters in Detroit, succeeding H. B. Smith.

Mr. Graham has been connected with United Motors for the past two years as a special field representative contacting the company's branches and distributors throughout the United States.

Governor Names Mayo

William B. Mayo, chief engineer of the Ford Motor Co., has been appointed by Governor Green of Michigan to represent Michigan at the national conference on Uniform Air Laws in Washington, Dec. 16 and 17. Mr. Mayo is chairman of the Michigan Board of Aeronautics.

Lycoming Adds 12-cyl. Marine Type

New Engine Develops
300 hp. at 2400 r.p.m.

WILLIAMSPORT, PA., Dec. 3—A twelve-cylinder 300 hp. marine engine has been added to the line of the Lycoming Mfg. Co. It is particularly designed for use in high-speed runabouts but is suited also for fast commuting boats and for express cruisers, and for this purpose can be furnished, for both right and left rotation, for twin-screw installation.

The bore and stroke are 4½ in. each, giving a piston displacement of 1010 cu. in. The compression ratio is 5 to 1 and the engine is said to deliver its rated power at 2400 r.p.m. The engine is of the V type and has the rather unusual V angle of 70 deg., which is said to reduce torsional vibration. Inlet manifolds are cast integral with the detachable cylinder heads, while the exhaust manifolds are bolted to the former and carried below them. Two Holley down-draft carburetors are mounted atop the intake manifolds, while two A.C. fuel pumps, driven by camshaft eccentrics, are placed alongside the carburetors. The two Delco-Remy distributors, one for each bank of cylinders, also are mounted on top of the engine, as are their respective coils. The most important accessories, therefore, are so located as to be readily accessible should any adjustments be required.

At the right, or starboard side, is placed a Delco-Remy back geared starting motor and, at the left, or port side, are grouped the oil and water pumps, generator and a duplex full-flow oil filter. An oil cooler with bypass adjustment is placed above the oil reservoir, which is located on the front of the engine directly ahead of the flywheel housing and forms an extension thereof. A Joe's planetary reverse gear and clutch are enclosed in an oil-tight case at the after end of the engine, with a heavy duty annular ball bearing taking up the propeller thrust, both fore and aft.

Ewald Appoints Towle

H. T. Ewald, president of the Campbell-Ewald company, announces the appointment of Capt. H. Ledyard Towle as general art director of the company.

Captain Towle comes to the Campbell-Ewald company from the Fisher Body Corp., where he acted as director of the color and advertising art studio. He was previously director of the Duco color advisory board.

Bohn Appoints Pritchard

Announcement has just been made by the Bohn Aluminum and Brass Corp. of Detroit, of the appointment of Don Pritchard to the staff of their Cleveland office.

Ford Produces 66,612 in Canada

10 Months Output is Adjusted to Sales

TORONTO, Dec. 1—Ford Motor Co. of Canada, Ltd., in the first ten months of 1930 produced 66,612 units, according to figures made available. This compares with 81,498 units produced in the corresponding period in 1929, and represents a decrease of 14,886, or 18.27 per cent.

When a reduction was announced in the price of Ford of Canada cars early this year, it was stated that the average cost per unit had declined and that the difference was being passed on to the consumers. The trade understands that retail sales of Ford of Canada in the first ten months are 65,313, as against 78,433 units up to the same time last year.

This indicates that production has been adjusted carefully to sales. Furthermore, registrations of Ford cars in Canada have run close to sales figures.

Gasoline Exports Increase

WASHINGTON, Dec. 2—Exports of gasoline and related refined petroleum products from the United States during the month of October reached 6,133,362 bbl., valued at \$21,863,725, according to the Department of Commerce. This compares with exports of 5,967,123 bbl., valued at \$26,341,039, for the month of October, 1929.

Exports of the same products for the 10 months ending October were 55,424,141 bbl., valued at \$224,585,840; and 50,097,124 bbl., valued at \$223,821,105, for the 10 months ending October, 1929.

Leipsc Fair Dates Set

NEW YORK, Dec. 2—The Leipsc Trade Fair for 1931 will be held March 1 to 7. It is expected that over 10,000 exhibits, assembled from 22 countries, will be shown at this fair.

Auto-Lite Position Better

CHICAGO, Dec. 1—C. O. Miniger, president of Electric Auto-Lite Co. states that November business of the company was 30 per cent ahead of last year. He predicted that October and November earnings would equal \$1.15 a share on the common stock after preferred dividends, but before Federal taxes. November business, he stated, was 20 per cent better than was anticipated the first day of the month.

Auto-Lite Declares

TOLEDO, Dec. 3—Electric Auto-Lite Co. has declared regular quarterly dividend of \$1.50 on common and \$1.75 on preferred, both payable Jan. 1 to holders of record Dec. 15.

A.S.M.E. Has Annual

NEW YORK, Dec. 2—The American Society of Mechanical Engineers is holding its annual meeting this week at the Engineering Societies Building in New York. In conjunction with this meeting the ninth annual Exposition of Power and Mechanical Engineering is being conducted at Grand Central Palace.

Canadian Imports Drop; British Proportion Gains

OTTAWA, Dec. 1—Imports of automobiles into the Dominion of Canada during the month of October were valued at \$943,000 as compared with \$1,776,000 for the month of October, 1929, according to the Dominion Bureau of Statistics. Of the imports for October of this year cars from the United Kingdom accounted for a valuation of \$37,000, while in the same month last year imports from the United Kingdom were valued at \$16,000, the remaining declarations in each case being supplied by imports of vehicles from the United States.

Canadian imports of parts during the month of October were valued at \$751,000 as compared with a valuation of \$1,941,000 for the same month of 1929. Of the preceding valuations imports of parts from the United Kingdom accounted for \$7,000 in October, 1930, and \$3,000 in 1929.

Nash Shortens Inventory

CHICAGO, Dec. 1—Demand for the new Nash cars, introduced Oct. 9, caused a curtailment of the customary week's inventory period at the various Nash plants, C. H. Bliss, sales manager, announces.

It has been the custom to close the plants for a complete inventory during the last week in November, before the close of our fiscal year, he said. This year, however, the continued demand has made it necessary to run the plants over into inventory week and use a part of the inventory period in order to meet the current orders for new cars.

George R. Elder Dies

NEW YORK, Dec. 2—George R. Elder, who retired recently as vice-president of Ingersoll-Rand Co. of New York, died at his home in Waterford, N. Y., last week in his 69th year. He is survived by a widow, a son, George R., Jr., and a daughter, Mrs. T. S. Fillmore of Easton, Pa.

Ajax Omits Interest

NEW YORK, Dec. 2—Ajax Rubber Co., which has reported a deficit for the past five years, has notified the New York Stock Exchange that interest due on its first mortgage 15-year eight per cent sinking fund bonds, due in 1936, is being omitted. This interest was due Dec. 1.

Legislatures Plan Higher Gasoline Taxes

1931 Sessions Will Revive Old Battle

NEW YORK, Dec. 2—Higher gasoline taxes will be sought in more than a quarter of the 44 states whose legislatures will be in session early in 1931, it is indicated in reports reaching the American Petroleum Institute.

Approval of increased rates at November referendums in New Jersey and Louisiana apparently has encouraged supporters of higher taxes on motor fuel and increases probably will be sought in the District of Columbia, Minnesota, Iowa, Pennsylvania, Wisconsin, Nebraska, Massachusetts, North Carolina, New York, Michigan, West Virginia, Washington, Colorado, Mississippi, South Dakota and Ohio.

With the latest changes in gasoline tax rates becoming effective in Louisiana Nov. 27 and in New Jersey Dec. 1, the gasoline tax schedule follows: Six-cent tax, 3 states; 5-cent tax, 10 states; 4-cent tax, 17 states; 3½-cent tax, 1 state; 3-cent tax, 11 states; 2-cent tax, 6 states and District of Columbia.

The increase generally sought is one cent per gallon. However, in the case of the District of Columbia it is proposed to double the present 2-cent tax, and an increase of 8 cents, which would make the total tax 12 cents per gallon, has been suggested in Nebraska.

S.P.A. Truck in Canada

WALKERVILLE, ONT., Dec. 2—An entirely new Studebaker ½-ton delivery car of distinctive appearance and engineered for long economical service is now announced by Studebaker Corp. of Canada, Ltd. Addition of this unit to the 1½ and 2-ton Studebaker trucks placed on the market in September, rounds out a line of commercial hauling vehicles. The new Studebaker ½-ton delivery car is available with a choice of three bodies, all mounted on a 114-in. wheelbase chassis with a 70-hp. six-cylinder engine, and are all priced at \$1,120 at the factory.

AC Sales Equal Last Year's

FLINT, MICH., Dec. 3—Replacement sales of AC products to jobbers during 1930 will be even with those of the record-breaking year of 1929, and far ahead of the average for the last three years, according to W. S. Isherwood, sales manager of AC Spark Plug Co.

Trico Adds Workers

CHICAGO, Dec. 1—J. R. Oishei, president of the Trico Products Corp., announces that the company has taken on 100 additional employees in the past three weeks. He said fourth quarter earnings would be satisfactory.

Canadian Production Slumps 43 Per Cent

October Production Was Lowest for Year

OTTAWA, Dec. 2—Production of automobiles in Canada during October at 4541 cars was the lowest number reported for any month of the year to date. This output was 43 per cent under the total of 7957 cars reported for the previous month and less than one-third of the production of 14,523 cars in October of a year ago. The Dominion Bureau of Statistics monthly index number on motor car production, which makes due allowance for seasonal tendencies and is based on the long-term trend, 1919 to 1927 inclusive, shows that the October rate of output in the Canadian automotive industry was 75 per cent below the normal for that month.

Data for October, when compared with that of the previous month, showed lowered outputs for all types of cars. Open passenger cars dropped to 822 from 1289, closed model passenger cars to 2303 from 3570, trucks to 315 from 509, chassis to 1096 from 2583, and only five taxicabs or buses were made in October against six of this type in September.

For the 10 months ending Oct. 31, 1930, the cumulative production of automobiles totaled 143,163 cars, a decline of 42 per cent from the aggregate of 248,376 cars made during the corresponding period of last year and 35 per cent less than the 221,188 cars made the first 10 months of 1928.

A calculation of the number of cars made available for distribution in Canada during October made by adding the imports of 1059 cars to the 2662 cars made for sale in Canada, gives a total of 3721 cars. For the year to date the number of cars made available for Canadian consumption, thus computed, totaled 127,126 cars.

Two S. A. Markets Described

WASHINGTON, Dec. 1—"The Automotive Market in Brazil" and the "Automotive Market in Chile" are two of the latest publications to be added to the Trade Promotion Series of the Bureau of Foreign and Domestic Commerce. Both booklets are the work of Howard H. Tewksbury, former American Trade Commissioner to South America, and are numbered in the series 106 and 107 respectively. Price of the first is 25 cents and of the second 15 cents, from the Superintendent of Documents, Government Printing Office, Washington.

Lincoln Sales Increase

DETROIT, Dec. 1—Sales of Lincoln automobiles during the last ten-day period totaled 121 cars, a sharp increase over the corresponding period of 1929, the Lincoln Motor Co. announced today. Sales for the same period of 1929 totaled 102 cars, the increase this year being 18.6 per cent.

Herring Sees Better Demand

OSHAWA, ONT., Nov. 30—Demand for automobile replacements has been backing up for some months, but must shortly be felt in the market, according to the view of W. C. Herring, assistant general manager in charge of sales, General Motors of Canada, Ltd., who has just returned from a coast-to-coast survey of the Canadian automotive field.

Servel Plans for Peak

EVANSVILLE, IND., Dec. 1—Servel and Hercules industrial plans for 1931 call for increase in operating staff early in December and a gradual building up thereon of a roster which by early summer will give the company a staff of 3000 people, the largest number of people ever employed by the combined industries, Col. Frank Smith, New York, president, stated here.

A new model commercial body just introduced by Hercules Products, Inc., is a refrigerator car comprising two compartments, one for preservation of perishable foods at low temperature, and another for storage of foods of less perishable nature. Included in large orders received for the new model is one for several hundred units for Swift & Co.

Advertising Linage Drops

NEW YORK, Dec. 1—Automotive advertising in daily and Sunday newspapers of the United States in October decreased 6,511,498 agate lines, or 43.8 per cent from the October, 1929, figure, according to a compilation by *Editor and Publisher* based on figures supplied by Media Records, Inc.

The greatest loss was suffered by Sunday newspapers, which showed a lineage decrease of 2,947,908, or 69.3 per cent, from the October 1929 figure. Daily newspapers dropped 3,563,590 lines in October of this year, a decrease of 33.6 per cent from the figure for last year.

Soviet Ahead of Program

NEW YORK, Dec. 1—Production of cars and trucks in the U.S.S.R. is running well ahead of program, according to statement issued by the Amtorg Trading Corp. of New York. The Amo plant in Moscow produced 375 automobiles during October as against a schedule of 360 units. The Putilov tractor plant produced 9735 tractors during the year ended Oct. 31, 1930. This plant has a program for 1931 of 35,700 units of which 25,000 will be assembled machines and 10,700 the equivalent in parts.

Salon Opens in New York

NEW YORK, Dec. 1—The twenty-sixth annual automobile salon opened here last night at the Hotel Commodore with 90 cars on exhibit.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

NEW YORK, Dec. 3—While retail trade has been stimulated by cold weather and by the approach of the holiday season, industrial activity has receded to new low levels. Further improvement in retail sales is expected as a result of the distribution of Christmas fund money, which took place on Dec. 1. Aside from such seasonal influences, the general position of business is regarded by most observers as substantially unchanged.

CAR LOADINGS

The movement of railway freight remains at a low level. Loadings during the week ended Nov. 15 numbered 829,251 cars, as compared with 881,401 cars in the preceding week and 982,926 cars in the corresponding period last year. For the year to date, the total is 41,621,726 cars, as against 47,703,565 cars a year ago and 46,143,059 cars two years ago.

BUSINESS FAILURES

Business failures reported to Bradstreet's for the week ended Nov. 26 numbered 470, as compared with 513 in the preceding week and 303 in the corresponding period of 1929.

CONSTRUCTION AWARDS

Construction contracts awarded in 37 states during the first three weeks of November, as reported by the F. W. Dodge Corp., had an average value of \$12,050,200 daily, as against \$12,973,100 for the month of October and \$15,640,500 for the month of November, 1929.

CRUDE OIL OUTPUT

Crude oil output in the United States continued to decline during the week ended Nov. 22, with a daily average of 2,281,850 bbl. as compared with 2,304,550 bbl. in the preceding week and 2,633,250 bbl. in the corresponding period last year.

BANK DEBITS

Bank debits to individual accounts outside of New York City during the week ended Nov. 26 were 24 per cent smaller than those in the corresponding week in 1929. The total for the year to date is 19 per cent below that a year ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 28 stands at 80.6, a new low for the year, as against 80.8 a week before and 82.2 two weeks before.

STOCK MARKET

Transactions on the New York Stock Exchange during the month of November totaled 51,949,840 shares, as compared with 65,497,479 shares in October and 72,455,420 shares in November last year.

Financial Notes

Commercial Investment Trust Corp. has called for redemption on March 1, 1931, of all of its outstanding six per cent convertible debentures due March 1, 1948, amounting to \$12,904,500.

Houdaille Hershey Corp. has declared regular quarterly dividend of 62½ cents on Class A, payable Jan. 2 to holders of record Dec. 20.

Autocar Co. has declared regular quarterly dividend of \$2 on preferred payable Dec. 15 to holders of record Dec. 5.

Commercial Credit Co. has declared quarterly dividends as follows: Fifty cents on common, \$1.62½ on 6½ first preferred, \$1.75 on 7 per cent first preferred, \$2 on 8 per cent Class B preferred and 75 cents on 3 per cent Class A, all payable Dec. 31 to holders of record Dec. 11.

Detroit Motorbus Co. has declared regular quarterly dividend of 20 cents payable Dec. 15 to holders of record Nov. 20.

Perfect Circle Co. has declared regular quarterly dividend of 50 cents payable Jan. 1 to holders of record Dec. 20.

United Aircraft and Transport Corp. has declared regular quarterly dividend of 75 cents payable Jan. 1 to holders of record Dec. 10.

Motor Stocks Advance

NEW YORK, Dec. 1—Motor securities advanced in market value during November to a greater extent than any other group, according to a compilation prepared by Frazier Jelke & Co., New York bankers. Stocks in seven of the leading motor companies increased in value \$72,878,000, or 3.9 per cent, thus contributing to a general advance during the month of 100 representative common stocks of \$405,615,000, or 1.7 per cent.

From a percentage basis mines, equipment and chemicals advanced more than motors, showing increases of 5.7 per cent, 6.9 per cent and 4.4 per cent, respectively. Merchandising stocks increased 3.5 per cent, foods 1.9 per cent and miscellaneous industrials 1.7 per cent.

During the month utilities declined in value 8.2 per cent, rails decreased, electrical companies 2.3 per cent, amusements 6.9 per cent and steels six-tenths of 1 per cent.

Opposes Bus Regulation

NEW YORK, Dec. 1—The National Industrial Conference League, at a recent meeting here, adopted a resolution opposing Federal regulation of motor trucks. In taking this action the league indorsed the conclusions made by the Interstate Commerce Commission at the close of its motor transport investigation, Docket 18,300, in 1926.

The league will participate in the hearings now being held by the Interstate Commerce Commission on rail-motor coordination, Docket 23,400.

Gleaner Postpones Meeting

CHICAGO, Dec. 1—The regular directors' meeting of the Gleaner Combine Harvester Corp., to consider the dividend action, due at this time, has been postponed until the return of S. H. Hale, president.

Stutz Sells Month's Supply

INDIANAPOLIS, Dec. 1—Operating on a weekly production schedule of five and a half days, the Stutz Motor Car Co. reports today that its entire output has been sold for a month in advance. Distributors and dealers have been notified that no orders can be accepted for delivery before the latter part of December.

Dodge Truck Sales Gain

DETROIT, Dec. 1—Deliveries of Dodge Brothers trucks to dealers in both September and October showed an increase over any previous month this year and exceeded the total deliveries for the five preceding months, according to a recent announcement.

The increase in the average shipments of Dodge trucks for these two months showed a gain of 124 per cent, or two and one-quarter times as compared with the average monthly deliveries for the first eight months of this year. This also represents an increase of 260 per cent, or more than three and one-half times the average of July and August. This September-October average is one and three-quarters times the deliveries made during the preceding high month this year, namely, March.

Reo Declares Dividend

DETROIT, Dec. 1—Directors of the Reo Motor Car Co. have declared a two per cent cash dividend, payable Jan. 2, to stockholders of record Dec. 10.

Although October operations were profitable, there is as yet no accurate basis for estimating the result of the last quarter, it was stated, and the dividend now declared is purely an expression of confidence in Reo's future and in the early revival of business generally.

Due to heavy shipments in October an increase of more than 100 per cent over the same month of 1929, Reo jumped to eighth position in the industry for that month, a new record for the company, it was stated.

Offers 5 Heater Models

DETROIT, Dec. 1—Five models of hot water car heaters are now being distributed nationally through United Motors Service Branches and authorized service stations in the United States and Canada. Three models manufactured by the Harrison Radiator Corp., and two by the North East Appliance Corp., covering all types of cars, are being offered.

Rumely Meeting Postponed

CHICAGO, Dec. 1—A special stockholders meeting of the Advance-Rumely Co., to have been held this week, has been deferred to Dec. 10, due to lack of a quorum. Only 101,000 votes were represented, while 130,000 are necessary. Shareholders were to have been asked to approve a plan of recapitalization.

Estimates Flying Fuel Consumption

All Aero Operations
Used 12,887,532 Gal.

WASHINGTON, Dec. 1—Airplanes engaged in both scheduled and miscellaneous flying operations consumed 12,887,532 gal. of gasoline and 537,212 gal. of oil during 68,669,928 miles of flying in the six months' period, Jan.-June, 1930, according to an estimate made by the Aeronautics Branch of the Department of Commerce based upon reports from aircraft operators.

Scheduled air transport planes flew 16,902,728 miles and consumed 6,218,271 gal. of gasoline and 202,249 gal. of oil during this six months' period. A total of 6,669,261 gal. of gasoline and 334,963 gal. of oil were used in 51,767,200 miles of flying by airplanes used in miscellaneous operations such as experimental, exhibition, industrial, student instruction and pleasure flying, according to the estimate.

Figures for the full year 1929 show that a total of 135,141,499 miles were flown by both types of operations and that 20,520,617 gal. of gasoline and 1,026,030 gal. of oil were consumed. Airplanes engaged in scheduled operations during 1929 flew 25,141,499 miles and used 6,285,374 gal. of gasoline and 314,268 gal. of oil. Airplanes flying in miscellaneous operations flew 110,000,000 miles and consumed 14,235,243 gal. of gasoline and 711,762 gal. of oil during that period.

Soviet to Have Bearing Plant

WASHINGTON, Dec. 4—One of the largest ball-bearing companies in Italy will erect a modern ball-bearing plant in Moscow for the Soviet government, according to a report received from Consul William W. Heard, Turin. It is proposed to double the present capacity. Representatives of the Italian company are reported to have left for Moscow to begin the work which, it is said, will be rushed. The agreement provides for training Soviet technicians and a number of them are understood to be engaged now in the Turin plant.

George P. Miller Dies

CHICAGO, Dec. 1—George Paul Miller, former president of Marmon Sales Company of Chicago, died Wednesday in a sanitarium in Peoria, Ill. where he was taken a month ago suffering from a nervous breakdown. Mr. Miller was born in Sheboygan Falls, Wis., in 1868 and had been in failing health for a year. Funeral services were held in Madison, Wis.

Ludlum Reports Loss

CHICAGO, Dec. 1—Ludlum Steel for the quarter ended Sept. 30 reports net loss of \$187,673 as compared with net income of \$136,421 in the third quarter last year.

Railroads Plan Short-Haul Service

Would Utilize Trucks From Train to Consumer

CHICAGO, Dec. 1—Rail lines entering Chicago are contemplating establishment of store-to-door delivery systems, similar to those used in metropolitan centers in the East, it has been revealed. The roads which are giving the proposition serious consideration are the principal short line carriers, including The Chicago & Alton, Chicago and Eastern Illinois, Chicago Great Western and Monon, and the following larger lines: Baltimore and Ohio, New York Central Lines; Illinois Central, Chicago and North Western and Milwaukee. The smaller roads are reported to be planning to establish this additional service for the benefit of the large shippers early next spring. Application to establish this new form of service will be filed with the Interstate Commerce Commission shortly after the first of the year, it is understood.

The service would provide the carriers with another weapon in their fight to regain freight service lost to motor trucks and the short line carriers, having been the hardest hit by this form of competition, are naturally eager to give an early try-out to the store-to-door delivery, which has proved advantageous.

Factory Officials Tour

DETROIT, Dec. 1—Two groups of officials representing the Chrysler Sales Corp. and Dodge Brothers Corp. started on country-wide sales promotion tours last week. Included in the Dodge group are W. J. O'Neill, vice-president in charge of manufacturing; A. vanDerZee, general sales manager; W. M. Purves, passenger car sales manager; Walter S. Graves, truck sales manager; A. H. Ferrendou, bus sales manager; F. N. Sim, director of advertising, and Lee Anderson, advertising counsel.

Cities in which the Dodge executives will hold meetings are Kansas City, Dallas, San Francisco, Portland, Minneapolis, Chicago, St. Louis, Cincinnati, Atlanta, New York and Boston.

D.A.C. Plans Heavy Schedule

DETROIT, Dec. 1—Production schedules for 60 military and transport planes to cost \$1,250,000 to cover the next six months, were announced today by P. R. Beasley, president of the Detroit Aircraft Corp. Plans for the next few months call for the largest production in the history of the company, Mr. Beasley stated.

Rubber Output Valued

MONTREAL, Dec. 1—Production in the rubber industry of Canada in the year 1929 had a total valuation of \$96,934,660. Of the total production, rubber tires and tubes accounted for 53 per cent or \$51,720,991.

+ + CALENDAR + + OF COMING EVENTS

SHOWS

Brussels, Belgium, Automobile...Dec. 6-17
Sioux City, Iowa, Automobile...Dec. 18-20
New York, National Automobile...Jan. 3-10
National Roadbuilders' Show and Convention, St. Louis...Jan. 10-16
Buffalo, N. Y., Automobile...Jan. 10-17
Newark, N. J., Automobile...Jan. 10-17
Milwaukee, Wis., Automobile...Jan. 10-18
Cincinnati, Automobile...Jan. 11-17
Baltimore, Automobile...Jan. 17-24
Boston, Automobile...Jan. 17-24
Hartford, Conn., Automobile...Jan. 17-24
Montreal, Automobile...Jan. 17-24
Detroit, Mich., Automobile...Jan. 17-24
Pittsburgh, Pa., Automobile...Jan. 17-24
Louisville, Automobile...Jan. 19-24
Omaha, Neb., Automobile...Jan. 19-24
Rochester, Automobile...Jan. 19-24
Washington, D. C., Automobile...Jan. 24-31
Chicago, National Automobile...Jan. 24-31
Cleveland, Ohio, Automobile...Jan. 24-31
Los Angeles, Calif., Automobile...Jan. 24-Feb. 1
Portland, Me., Automobile...Jan. 26-31
Springfield, Mass., Automobile...Jan. 26-31
Syracuse, N. Y., Automobile...Jan. 26-31
Wilkes-Barre, Pa., Automobile...Jan. 26-31
Lancaster, Pa., Automobile...Jan. 27-31
Minneapolis, Minn., Automobile...Feb. 1-8
San Francisco, Calif., Automobile...Feb. 1-8
St. Paul, Minn. (Joint show with Minneapolis)...Feb. 1-8
Scranton, Pa., Automobile...Feb. 2-7
St. Louis, Mo., Automobile...Feb. 2-7
Camden, N. J., Automobile...Feb. 25-March 2
Denver, Automobile...Feb. 9-14
St. Petersburg, Fla., Automobile...Feb. 9-14
Mankato, Minn., Automobile...Feb. 11-14
Peoria, Ill., Automobile...Feb. 11-15
Rapid City, S. D., Automobile...Feb. 12-16
Indianapolis, Ind., Automobile...Feb. 14-19
Providence, R. I., Automobile...Feb. 14-21
Quebec, Automobile...Feb. 21-28
Des Moines, Automobile...Feb. 23-28
Seattle, Wash., Automobile...Feb. 24-Mar. 1
International Garage Exposition, Berlin, Germany...May 9-Aug. 9

CONVENTIONS

Motor Truck Asso. of America, New York City...Dec. 10
First International Aerial Safety Congress, Paris, France...Dec. 10-23
American Management Asso. (Shop Methods Division), Pittsburgh, Pa...Dec. 11-12
Highway Research Board, Washington...Dec. 11-12
National Research Council, Washington, D. C...Dec. 11-12
Motorcycle & Allied Trades Asso., Annual, New York City...Jan. 7
Society of Automotive Engineers, Annual Dinner, New York...Jan. 8
Society of Automotive Engineers, Annual Meeting, Detroit...Jan. 19-23
Natl. Association of Engine & Boat Manufacturers, New York City...Jan. 23
Natl. Paving Brick Mfg. Association, Pittsburgh, Pa...Feb. 4-6
A. S. M. E. Fuels Meeting, Chicago...Feb. 11-13
Society for Steel Treating (National Western Metal and Machinery Exposition), San Francisco...Feb. 16-20
Road Show and School, Wichita...Feb. 24-27
American Chemical Society, Indianapolis, Ind...March 30-April 4
U. S. Chamber of Commerce, Atlantic City...April 28-May 1

SALONS

Brussels, Belgium, Salon...Dec. 6-17
Los Angeles, Calif., Biltmore Hotel...Feb. 7-14
San Francisco, Calif., Palace Hotel...Feb. 21-28

NOTE: New York and Chicago Show Weeks' Events are listed on page 845 of the News Section.

Auburn Votes Regular Dividend

CHICAGO, Dec. 3—The Auburn Automobile Co. today declared its regular quarterly dividend of \$1 a share on its capital stock and the usual additional quarterly stock dividend of 2 per cent.

Parker Bus Bill "First Step," Says I.C.C.

May Prove Inadequate in Future, Report Says

WASHINGTON, Dec. 4—The Parker motor bus bill (H. R. 10,288) will, in the opinion of the Interstate Commerce Commission, be only a first step in the regulation which the commission believes ought to be taken without delay, the commission says in its annual report submitted to Congress today.

The commission states, however, that it is not unlikely that such legislation, in the form now proposed, may prove inadequate to meet all the needs of the situation. It is pointed out that the commission's investigation now under way regarding the extent of motor vehicle operations in interstate commerce and their relation to rail and water transportation and the manner in which such operations are being conducted may develop facts pertinent to legislation.

The Parker bill, it is explained, incorporates some, but not all, of the commission's recommendations. It is not believed that the Parker bill will be enacted at the short session of Congress, which convened last Monday.

New Era Files Petition

NEW YORK, Dec. 1—New Era Motors Co., original producers of the Ruxton front-wheel drive assembly and owners of the patents covering that car, has filed a petition in voluntary bankruptcy in the Federal District Court here. Assets are listed to include notes of the Kissel Motor Car Co. valued at \$91,495, patents valued at \$51,000, 42,000 shares of stock in Moon Motor Car Co., 8480 shares of Kissel Motor Car Co., accounts receivable of \$43,991 and cash \$84,795. The principal creditors are A. M. Andrews Investment Corp., Archie M. Andrews and Ashton & Russell.

McKinnon Payroll Gains

ST. CATHARINES, ONT., Dec. 1—"Our payroll increased 25 per cent in October over September of this year," recently said H. J. Carmichael, president of the McKinnon Industries branch of General Motors of Canada, Ltd.

Willys Reports Loss

NEW YORK, Dec. 2—Willys-Overland, Inc., and subsidiaries, report net loss for the quarter ended Sept. 30 of \$2,581,197 after all charges. This compares with profit in the corresponding quarter of last year of \$119,381.

Morse Cuts Dividend

CHICAGO, Dec. 1—Directors of Fairbanks, Morse & Co. have declared a quarterly dividend of 40 cents a share on the common stock, thereby placing these shares on a \$1.60 annual basis, against \$3 heretofore paid.